PlantScape

Server and Client Configuration Guide

Honeywell

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Related Documentation

For a complete list of publications and documents for PlantScape, see the *PlantScape Overview*.

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Glossary

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1 About This Guide

This Guide is intended primarily for engineers and system administrators who are responsible for configuring and supporting Release 400 of the PlantScape server software.

It describes:

- The recommended order for configuring the server
- Mandatory and optional configuration procedures
- Administration procedures

Note This Guide describes the configuration procedures for systems that are using Honeywell and third-party controllers such as Allen-Bradley, Series 9000, TDC 3000 Data Hiway, UDC, and so on.

It does not describe the configuration tasks for the Honeywell PlantScape Control Processor. For information about configuring the PlantScape Control Processor, refer to the *PlantScape Process Control Building Guide*.

Before Reading This Guide

Before using this Guide to configure your PlantScape server, you need to:

- Understand basic PlantScape concepts such as “channel,” “controller,” “point,” and “Station,” as explained in the *Overview Guide*.
- Install the PlantScape and third party software as described in the *Installation Guide*.

In following the procedures in this Guide, it is useful to have documented your site and processes (for example, in a single-line or process and instrumentation diagram) as suggested in the *Overview Guide*. This will help you to match it to the PlantScape server database that you want to build.

Prerequisite Skills

This Guide assumes that you have a basic knowledge of the hardware you are using: that is, the computers, printers, network components, and especially the field devices and controllers, such as programmable logic controllers (PLCs).

It also assumes that you have a basic familiarity with the Microsoft Windows operating systems that you are using.

How to Use This Guide

"Configuration Overview" on page 5 introduces you to the main configuration tasks and tools, and shows you where they are described in this Guide.

The "Configuration Tutorial" on page 13 gives you hands-on experience in performing basic server configuration tasks, and is particularly intended for those who are new to PlantScape. It shows you how to start Quick Builder and introduces its key features. Quick Builder is used to configure Stations, printers, controllers, and standard points.

Configuring the server is described in the chapters listed below. These chapters do not, however, provide controller-specific configuration information. When configuring controllers for your system, you also need to refer to:

- The controller-specific online reference information that comes with Quick Builder
- The hardware documentation and third-party software documentation for the devices that you will be using in your system

If your system uses the PlantScape Control Processor, you will also need to refer to the PlantScape Process Software documentation.

For information about configuring the server, see:

- "Configuring Stations and Printers" on page 57
- "Configuring Controllers" on page 97
- "Configuring Points" on page 115
- "Configuring Alarm Paging" on page 197
- "Configuring Security and Access" on page 209
- "Configuring Group and Trend Displays" on page 225
- "Template Displays and Container Points" on page 237
- "Configuring Reports" on page 239
- "Configuring and Monitoring a Redundant Server System" on page 301
- "Configuring Distributed Server Architecture" on page 335
- "Configuring Schedules" on page 357
- "Configuring Recipes" on page 365
- "Configuring Downtime Analysis" on page 375
- "Configuring Extended Event Archiving" on page 383
- "Stopping and Starting the Server" on page 25
- "File Structures and Disk Optimization" on page 27
- "Backups and Recovery" on page 31

For supplementary reference information, see:

- “Using PlantScape Data in Other Applications” on page 391
- “Command Reference” on page 483
- “Troubleshooting Advice” on page 531

2 Configuration Overview

This chapter introduces the configuration tasks and tools for the PlantScape server.

To configure PlantScape means to customize the PlantScape server database for your plant. It involves defining communication connections, and the data acquisition and control that you want to implement at your site.

Configuration also involves setting up standard displays and reports, and a range of optional features such as redundancy, point control scheduling, extended event archiving, recipes, and so on.

Assumptions and Prerequisites

The configuration procedures described in this Guide assume that you have already installed PlantScape software and third-party software as described in the *Installation Guide*.

Configuration Environment and Tools

A typical PlantScape configuration environment features the following components:

- A server running the Windows 2000 operating system.
- One or more operator Stations running the Windows 2000 or Windows NT operating system, and printers connected to the server. (In most basic systems, the Station software and the server software run on the same computer.)
- One or more controllers connected to the server.

The following tools are used for configuring PlantScape:

- Quick Builder (for configuring Stations, printers, controllers other than the PlantScape Control Processor, and points on those controllers)
- Control Builder (for configuring control strategies on PlantScape Control Processors)
- Station
- Display Builder
- Various utilities

These tools are described below. For more detailed information about the environments that Quick Builder, Station, and Display Builder can run in, refer to the *Installation Guide*.

Quick Builder

Quick Builder is a graphical tool for defining the hardware items and points in your system. Quick Builder can run on a server, or on another computer in your system.

After defining hardware and points with Quick Builder, you download these definitions from Quick Builder to the server database. For a more detailed description of Quick Builder, refer to “Using Quick Builder” on page 53.

Quick Builder comes with a set of predefined reports that you can use for documenting your configuration database. If you want to create additional reports, you need to purchase and install a third-party report-building application. For more details, refer to the *Installation Guide*.

Tools Used in Earlier Products

Quick Builder is a replacement for the following tools that were used in older releases of the product:

- **hdwbld**
- **pntbld**
- **bckbld**

The procedures in this Guide assume that Quick Builder is the configuration tool for points and hardware, and that **pntbld**, **hdwbld**, and **bckbld** are only used for specific diagnostic purposes. If you have some particular reason for using the older tools, refer to the *Hardware and Point Build Reference* for information about them.

Control Builder

For information on Control Builder, refer to the PlantScape Process Control Building Guide.

Station

Station is the user interface to PlantScape and includes setup and configuration displays, as well as displays that operators can use for monitoring and controlling plant processes.

Station can run on the server or on another computer connected to the server, known as an operator Station.

This Guide shows you how to start Station, and how to use configuration displays and other standard Station displays.

Display Builder

Display Builder is a tool that you can use to build custom graphical displays. Because specialized staff are often employed for setting up the graphics and animation for a custom display, Display Builder is described in a separate publication, the *Display Building Guide*.

PlantScape is available with two versions of Display Builder. Display Builder Classic allows you to build custom displays and save the displays in the propriety dsp format. The new HMI Web Display Builder allows you to create custom displays using Web-based features and save the displays in HTML format.

Display Builder can run on the server or on another computer in your system.

PlantScape Server Utilities

Utilities that run on the server are available to assist you in configuration and administration tasks. Utilities that apply to specific controllers, such as communications testing utilities, are described in the controller references. General utilities are described in “Command Reference” on page 483, and referred to throughout this guide.

Server Scripting

You can extend the functionality of PlantScape by creating *server scripts*. As you configure your system, you may want to create server scripts for:

- Servers
- Point servers
- Points
- Reports

The type of script you want to create determines the tool you use. For example, if you want to create a script that runs at specified times, you use Station to create the script. If you want to create a script that performs a task when the status of a point changes, you use Quick Builder to create the script. For more information see the *Server Scripting Reference*.

Configuration Procedures

The table below shows the procedures for configuring the PlantScape server in their recommended sequence. The table also shows:

- Which procedures are part of a basic PlantScape server installation, but are not mandatory (“Optional Procedure”).
- Which procedures relate to licensable options (“PlantScape Option”).
- Where to find the information you need to plan and complete the procedures.

Procedure	***Tool***	***For Details, See...***
Define Station and printer connection	Quick Builder	“Configuring Stations and Printers” on page 57. Quick Builder online help.
Define Station setup details, and complete Station and printer configuration	Station	“Configuring Stations and Printers” on page 57.
Define areas if you are using a distributed server architecture or you want to divide your system into areas.	Station	“Dividing the System into Areas” on page 91
Define controllers and the communications paths from the controllerstotheserver(Thisstepis not required for PlantScape Control Processors.)	Quick Builder	“Configuring Controllers” on page 97. Quick Builder online help.
Test communications between the server and the controllers	Controller-specific test utilities	For PlantScape Control Processors, refer to the PlantScape Process Software documentation. For other controllers, refer to: “Configuring Controllers” on page 97. “Command Reference” on page 483. Quick Builder online help.

Table 2.1 Configuration Procedures Checklist

Procedure	***Tool***	***For Details, See...***
Implement a control strategy for points on Honeywell Control Processors and define points on other controllers. If required, create server scripts.	Control Builder and/or Quick Builder	For points on PlantScape Control Processors, refer to the PlantScape Process Software documentation. To define history collection for these points refer to "Viewing History Collection Configuration" on page 169. For points on other controllers refer to: • "Configuring Points" on page 115 • Quick Builder online help For information on server scripts see the *Server Scripting Reference*.
Define standard points (analog, status and accumulator) on controllers and, if required, create server scripts.	Quick Builder	"Configuring Points" on page 115. Quick Builder online help. *Server Scripting Reference*.
Define flexible points (PlantScape Options) and, if required, create server scripts.	Appropriate point server tool Station	Device-specific documentation. *Server Scripting Reference*.
Configure system security	Quick Builder and Station	For server system security, see "Configuring Security and Access" on page 209. For operating system security, see the Administration and Startup Guide.
Configure a Redundant Server system (PlantScape Option)	Station and **hdwbld**	"Configuring and Monitoring a Redundant Server System" on page 301.
Configure for Distributed Server Architecture (PlantScape Option)	Station	"Configuring Distributed Server Architecture" on page 335.

Table 2.1 Configuration Procedures Checklist (Continued)

Procedure	*Tool*	*For Details, See...*
Configure operating groups and trend sets (optional procedure)	Station	"Configuring Group and Trend Displays" on page 225.
Configure pre-formatted reports and create server scripts to run on completion of reports (optional procedure)	Station	"Configuring Reports" on page 239. *Server Scripting Reference*
Configure Point Control Schedules (PlantScape option)	Station	"Configuring Schedules" on page 357.
Configure Recipes (PlantScape Option)	Station	"Configuring Recipes" on page 365
Configure Downtime Analysis (PlantScape Option)	Station	"Configuring Downtime Analysis" on page 375
Configure Extended Event Archiving (PlantScape Option)	Station	"Configuring Extended Event Archiving" on page 383.
Configure Microsoft Excel Data Exchange and the ODBC options. Develop applications that use the Application Programming Interface (API), and Network API, (Optional Procedure)	Microsoft application development tools	"Using PlantScape Data in Other Applications" on page 391. *Application Development Guide.*
Set up user accounts, configure operating system security, and perform system backups.	Microsoft Windows 2000 (server and client), Microsoft Windows NT (client only)	Administration and Startup Guide.
Build custom displays and, if required, create display scripts (Optional Procedure)	Display Builder	*Display Building Guide.*

Table 2.1 Configuration Procedures Checklist (Continued)

Note While configuring the server, it is recommended that you make regular backups (preferably daily). After configuration is complete, make a full backup. For information on performing backups, refer to the Administration and Startup Guide.

3 Configuration Tutorial

This tutorial walks you through typical, though simple, configuration steps.

It does not provide detailed explanations of the configuration tools and tasks. It is only intended to familiarize you with the tools and utilities used to configure the PlantScape server, so that you can get your system up and running as quickly as possible. The tools and tasks are described in detail in subsequent chapters of this Guide.

Note A number of the steps in this tutorial apply only to configuring controllers other than PlantScape Control Processors and points on those controllers. For information about configuring PlantScape Control Processors, refer to the *PlantScape Process Control Building Guide*.

Tutorial Tasks

The tutorial provides a short, guided tour of the following typical configuration tasks:

1. Defining a server Station
2. Defining a channel and controller with Quick Builder (not applicable for PlantScape Control Processors)
3. Defining points with Quick Builder (not applicable for PlantScape Control Processors)
4. Downloading the configuration database from Quick Builder to the server (not applicable for PlantScape Control Processors)
5. Starting the server Station
6. Configuring a Trend Set display and a Group display

The tutorial sets up PlantScape to match the architecture diagram shown in the following figure, with:

- A server (a server Station)
- A LAN-connected operator Station
- An Allen-Bradley PLC-5

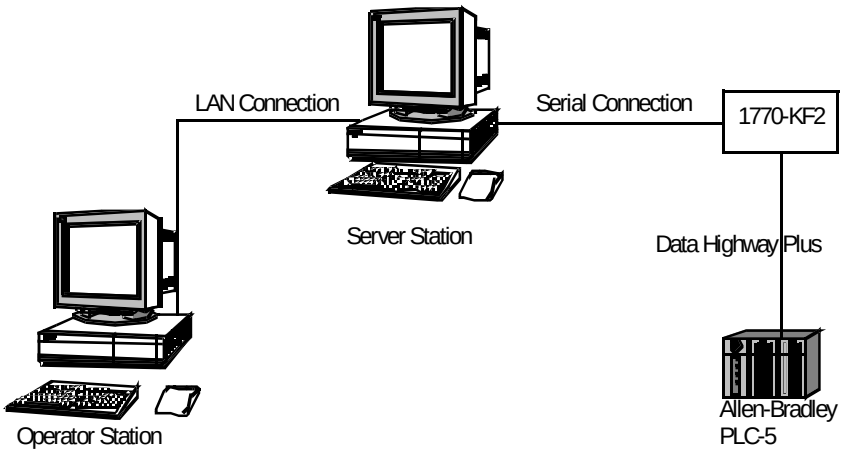

Figure 3.1 Sample Architecture

Assumptions

The tutorial assumes that you have:

- Successfully installed PlantScape (including Station and Quick Builder) on the server, as described in the installation guide
- Started the PlantScape server, and logged on with Honeywell Administrator privilege

The procedures in “Starting the Stations” on page 38 also assume that you have installed Windows and Station on a separate operator Station. If you have not done so, you can follow the alternative procedures described in that section.

For the purposes of completing this tutorial, you do not need to have connected the separate operator Station or the controller to the server.

Starting Quick Builder and Creating a Project File

The first step in configuring the server database is to start Quick Builder and create a project file to store your configuration data.

To start Quick Builder:

1 Click the **Start** button and select **Programs** ⇒ **PlantScape Server** ⇒ **Quick Builder**.

This displays the Quick Builder window with a dialog box on top, prompting you to choose between creating a new project and opening an existing project.

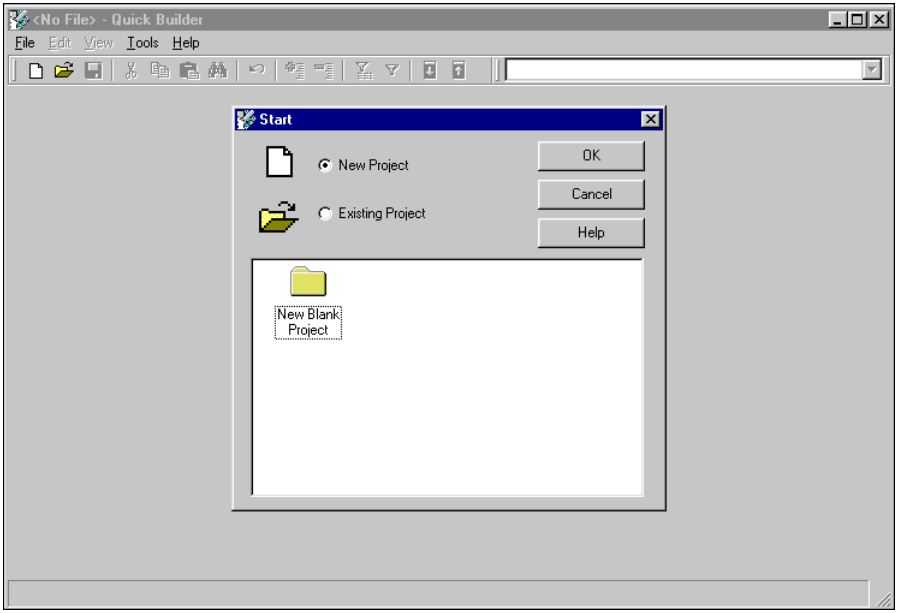

Figure 3.2 Quick Builder Window

2 With **New Project** selected, click **OK**.

This displays the Create New Project dialog box.

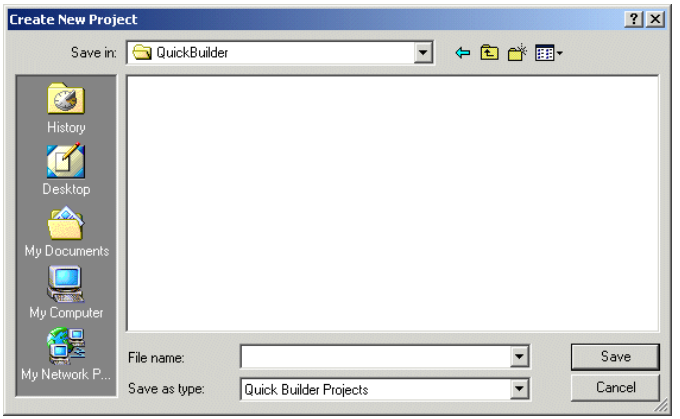

Figure 3.3 Create New Project Dialog Box

3 In the **File name** field, type:

`tutorial.qdb`

4 Click **Save**.

This displays the Enable Components dialog box.

5 Select **PlantScape** as the server type.

6 Enable the components you want to include in the project.

Tip *You can limit the components in a project to improve Quick Builder's performance. Either enter your licence details, which will only enable the components you are licensed for, or click the Enable components tab and deselect the components you want to disable.*

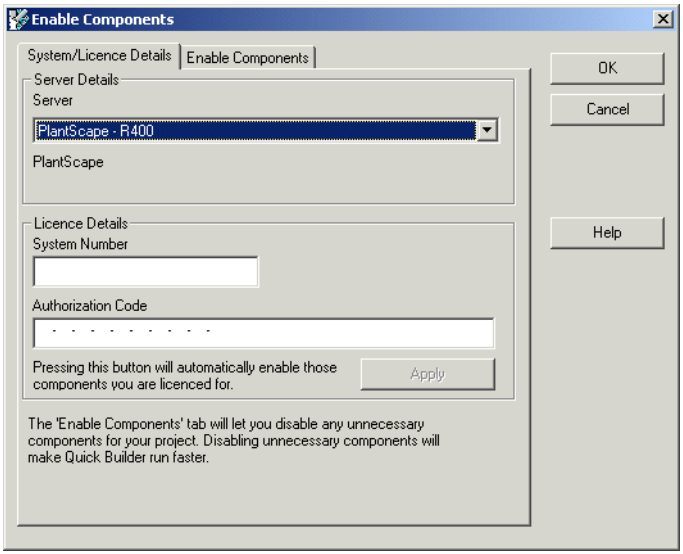

Figure 3.4 Enable Components Dialog Box

7 Click **OK** to close the Enable Components dialog box.

In a few moments, this creates the new project file and re-displays the Quick Builder window with the name of the new project file displayed in the title bar.

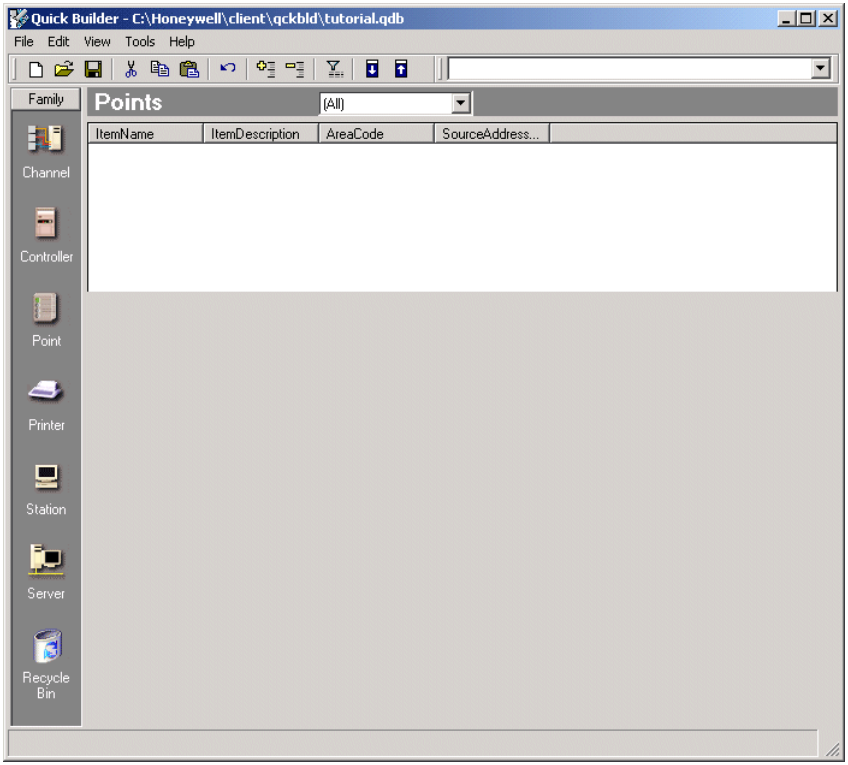

Figure 3.5 Quick Builder Window After Creating a New Project File

Defining a Station

Stations are your “window” into the server databases. They are your means for accessing and controlling plant and process data.

This topic shows you how to:

- Create a Station item to represent the Station running on the server
- View the properties for the server Station item
- Create a Station item to represent a LAN Rotary Station (that is, a computer that is running Station and is connected to the PlantScape server via a LAN)

For information on the difference between a LAN Rotary Station and a LAN Static Station, see “Connection Types” on page 58

Creating and Defining a Server Station

To create and define a server Station for your project:

1 In the Quick Builder menu bar, go to the **Edit** menu and select **Add Item(s)**. This displays the Add Item(s) dialog box.

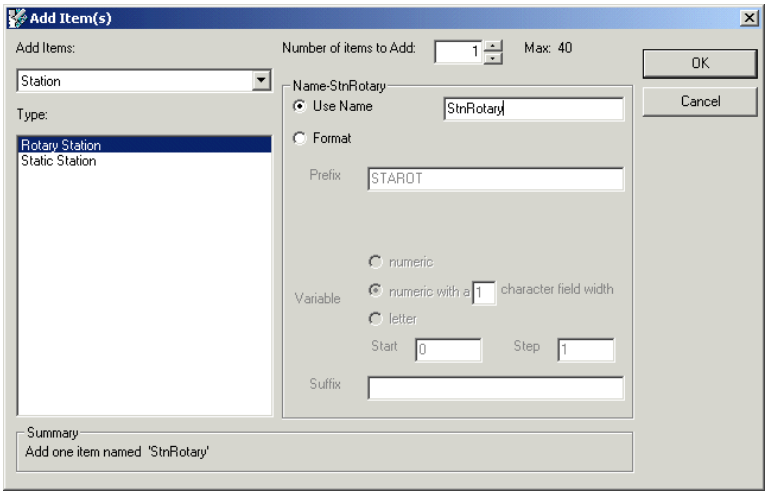

Figure 3.6 Adding a Station

2 Use the Add Item(s) dialog box as follows:

a) From the **Add Items** drop-down list, select **Station**.

b) In the list of Station types, select **Static Station**.

c) In the **Number of items to Add** field, leave the default selection of **1**.

3 Click **OK** to add the Station to the item list.

4 Select the Station item in the item list, and complete the fields in the Main tab as follows:

a) In the **Station Name** field, type:

```
SrvStation
```

b) In the **Description** field, type:

```
Server Station
```

5 Leave the default settings in the remaining fields.

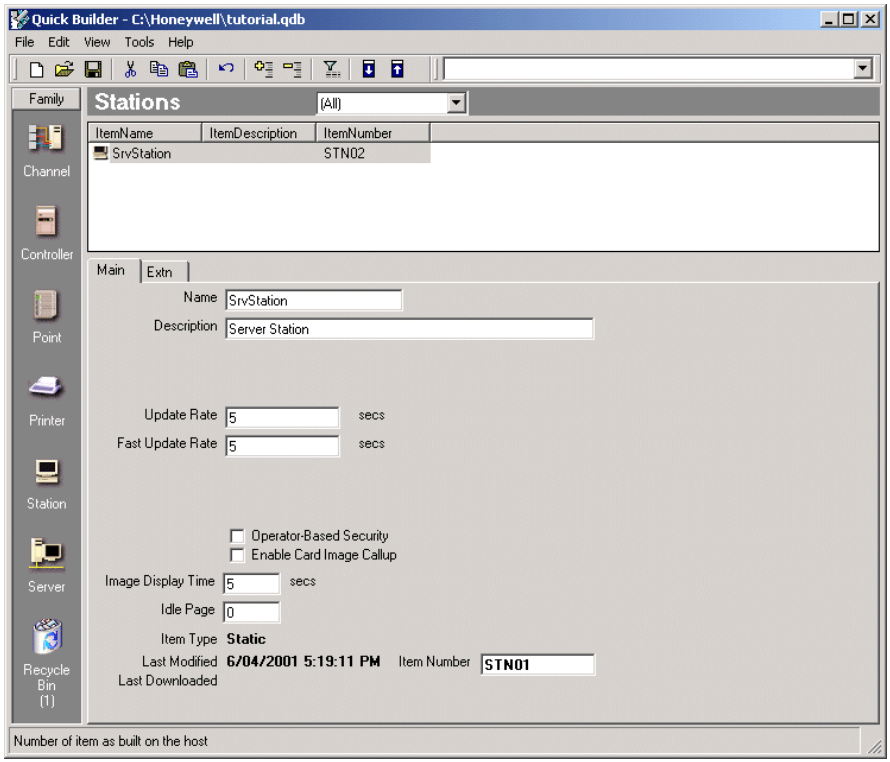

Figure 3.7 Server Station Item and Its Tabs

Creating and Defining a LAN Rotary Station Item

To create and define a LAN Rotary Station for your project:

1 In the Quick Builder menu bar, go to the **Edit** menu and select **Add Item(s)**.

This displays the Add Item(s) dialog box.

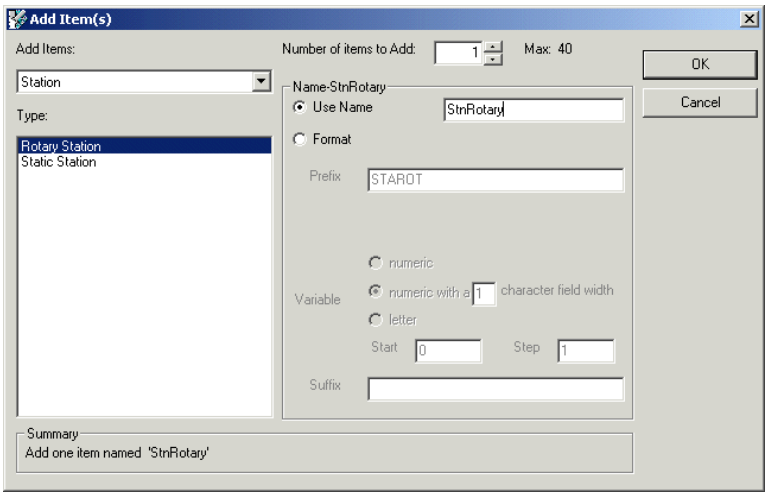

Figure 3.8 Adding a Station

2 Use the Add Item(s) dialog box as follows:

a) From the **Add Items** drop-down list, select **Station**.

b) In the list of Station types, select **Rotary Station**.

c) In the **Number of items to Add** field, leave the default selection of **1**.

d) In the **Station Name** field, type:

```
StnRotary
```

3 Click **OK** to add the Station to the item list.

4 Select the Station item in the item list, and complete the fields in the Main tab as follows:

a) In the **Description** field, type:

```
Station for Engineer/Manager
```

b) Leave the default settings in the remaining fields.

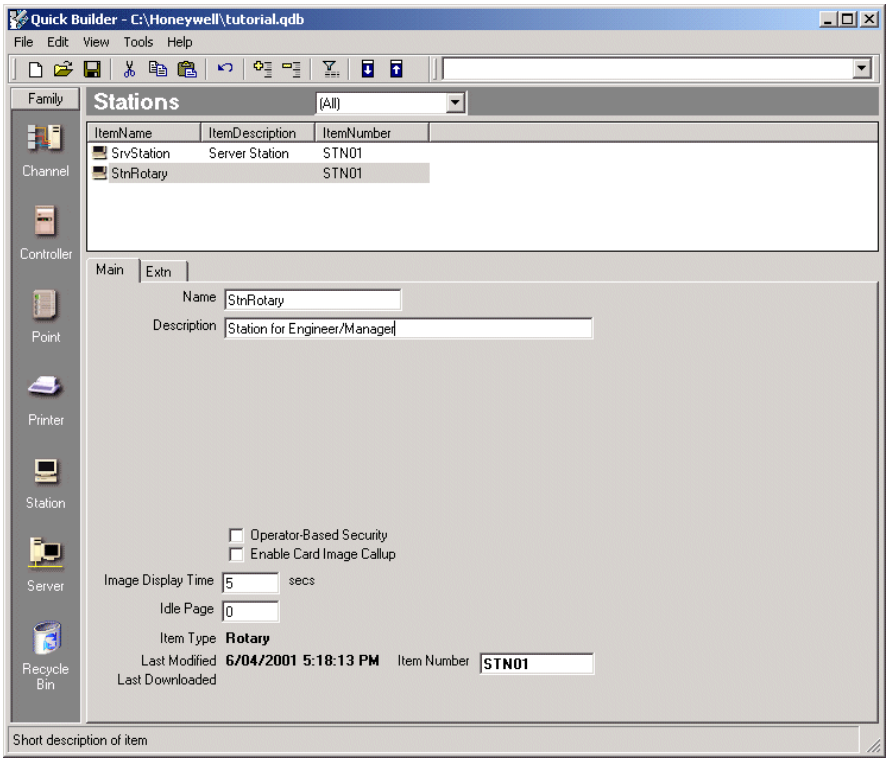

Figure 3.9 New Station Item for a LAN Rotary Station Item

Defining a Channel and a Controller

This topic only applies to sites that are using controllers other than PlantScape Control Processors. If you are using only PlantScape Control Processors, you do not need to define channels and controllers.

Before PlantScape point data can be read from or written to a controller, you need to define:

- Which types of controllers you are using
- How they are connected to the server

This topic shows you how to:

- Define a serial connection to (that is, a channel for) an Allen-Bradley PLC-5 on a Data Highway Plus
- Define the Allen-Bradley controller

Defining a Serial Connection

To define a serial connection to a controller you need to create a channel for your project:

1 From the **Edit** menu in Quick Builder, select **Add Item(s)**.
The Add Item(s) dialog box is displayed.

2 Use the Add Item(s) dialog box as follows:
a) From the **Add Items** drop-down list, select **Channel**.
b) From the list of channel types, select **AllenBradley**.
c) In the **Number of items to Add** field, leave the default selection of **1**.
d) In the **Use Name** field, type `Abrchn01`

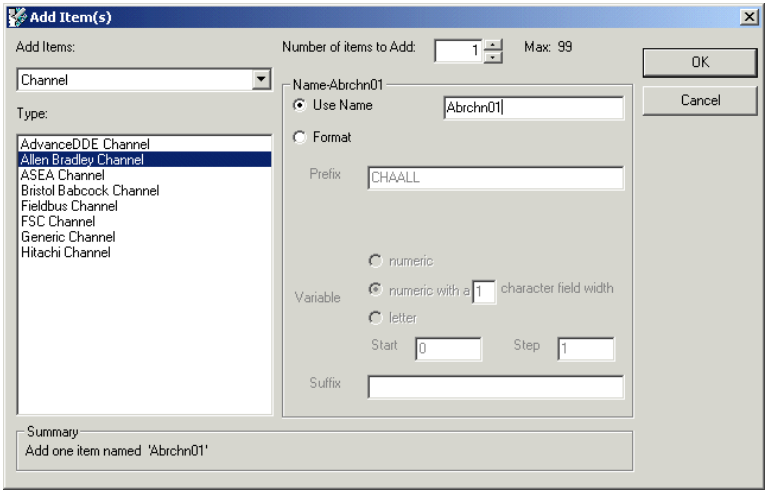

Figure 3.10 Using the Add Item(s) Dialog Box to Add a Channel

3 Click **OK**.

4 Select the channel item in the item list and complete the fields on the Main tab as follows:

a) In the **Description** field, type **`via COM1 through KF2 to DH+`**

You can ignore the remaining fields on this page for the purposes of this tutorial.

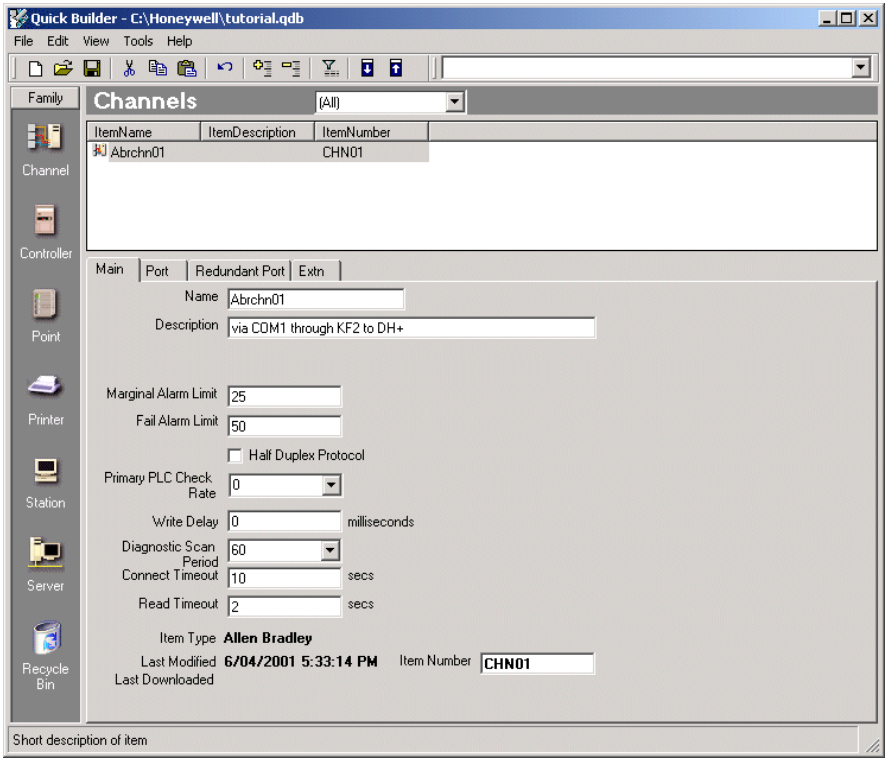

Figure 3.11 Main Tab for the Channel

5 Click the Port tab to display the Port tab and check that the fields are completed.

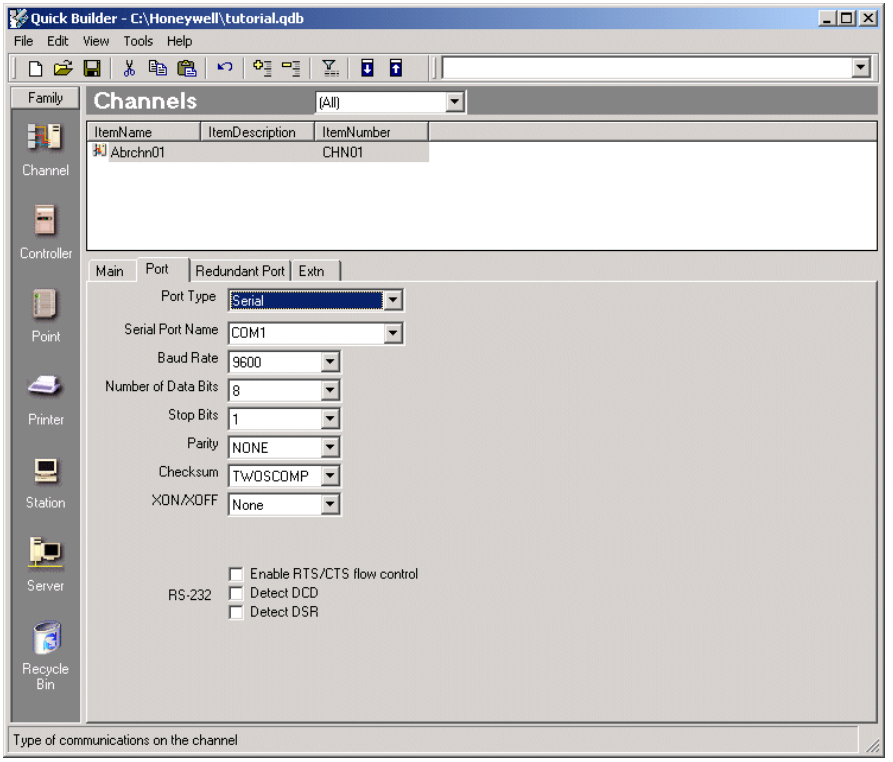

Figure 3.12 Port Tab for the Channel

Defining an Allen-Bradley PLC

To define an Allen-Bradley PLC you need to create and define a controller item for your project.

To define a controller:

1 From the **Edit** menu, select **Add Item(s)**.
This displays the Add Item(s) dialog box.

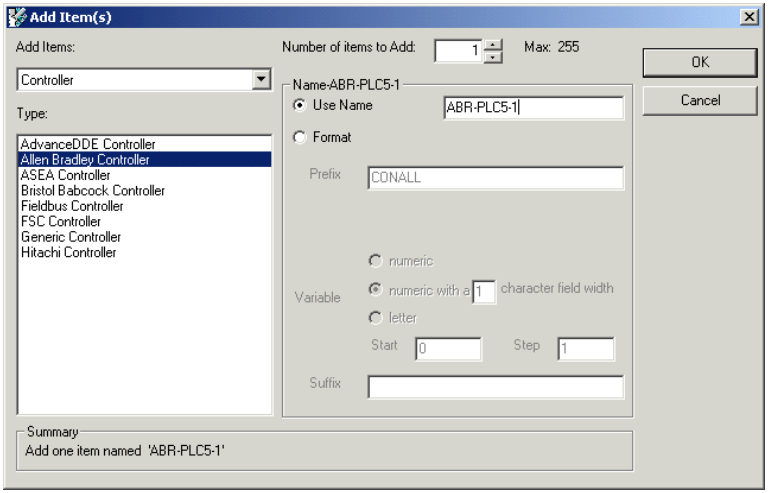

Figure 3.13 Using Add Dialog Box to Add a Controller

2 Use the Add Item(s) dialog box as follows:

a) From the **Add Items** list, select **Controller**.

b) From the list of controller types, select **AllenBradley**.

c) In the **Number of items to Add** field, leave the default selection of **1**.

d) In the **Use Name** field, type **`ABR-PLC5-1`**.

e) In the **Start** field for defining the variable name, type **1**.

3 Click **OK**.

4 Select the first controller item in the item list and complete the fields on the Main tab as follows:

a) In the Description field, type **`Allen-Bradley Tank Control`**

b) Select `Abrchn01` as the **Channel Name** from the list.

c) In the **PLC Station ID** field, type **1**

(This is the station ID of the first PLC on the Data Highway Plus (DH+).)

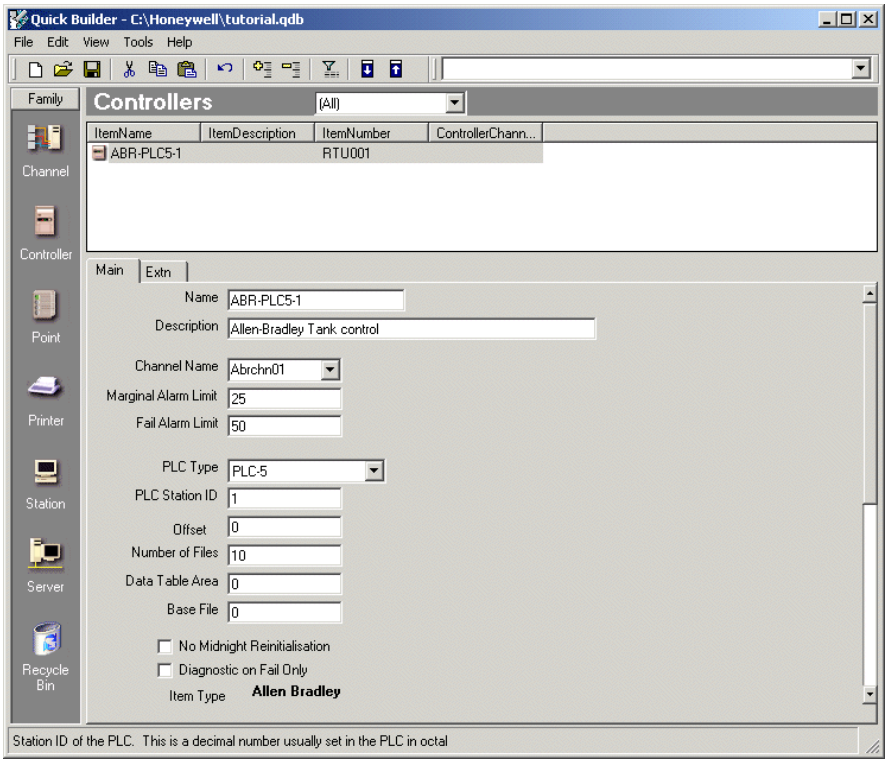

Figure 3.14 Controller Main Tab

Defining a Status and an Analog Point

In PlantScape, any sensors connected to the PLC are mapped into points for viewing and control.

We will now define:

1 A status point to control a pump

2 An analog point to monitor the level of a tank

Defining a Status Point to Control a Pump

To define a status point to control a pump:

1 From the **Edit** menu in Quick Builder, select **Add Item(s)**.

2 Use the Add Item(s) dialog box as follows:

a) From the **Add Items** list, select `Point`.

b) In the list of point types, select **Status Point**.

c) In the **Number of items to Add** field, leave the default selection of **1**.

d) In the **Use Name** field, type **`PUMPSTS`**.

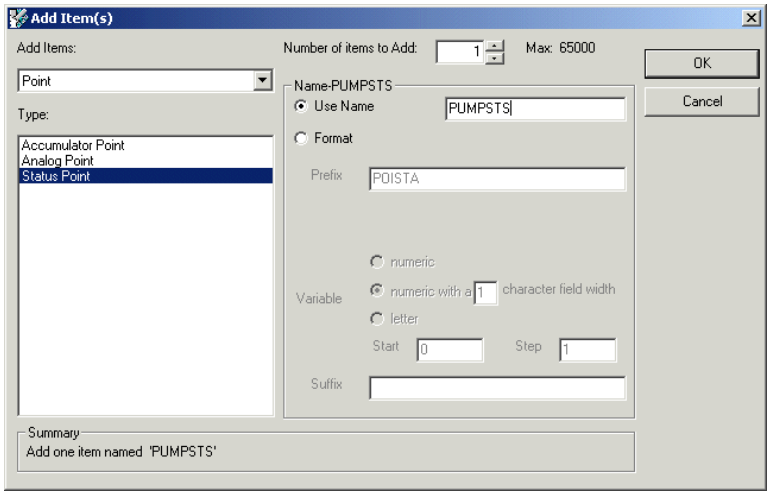

Figure 3.15 Using Add Dialog Box to Add a Status Point

3 Click **OK**.

4 Select the point item in the item list, and complete the fields on the Main tab as follows:

a) In the **Description** field, type **`Pump Status`**.

b) From the **PV Scan Period** drop-down list, select **5** seconds.

c) From the **Number of States** drop-down list, select **2**.

d) In the **State 0** field, type **`OFF`**.

e) In the **State 1** field, type **`ON`**.

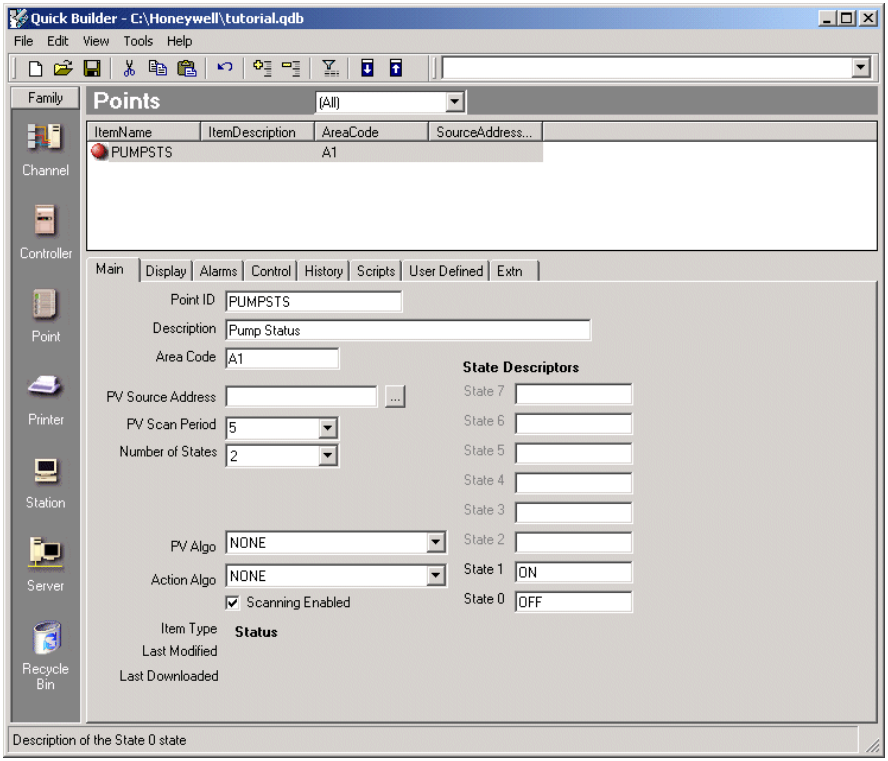

Figure 3.16 Status Point Main Tab

5 Select the **...** button next to the **PV Source Address** field.
This displays the Address Builder dialog box.

6 Complete the fields in the Address Builder dialog box as follows:

a) From the **Address Type** list, select **CONTROLLER**.

b) From the **Controller Names** list, select **ABR-PLC5-1**.

c) In the **Location** field, type the following PLC-5 memory location **`I:001/10`**

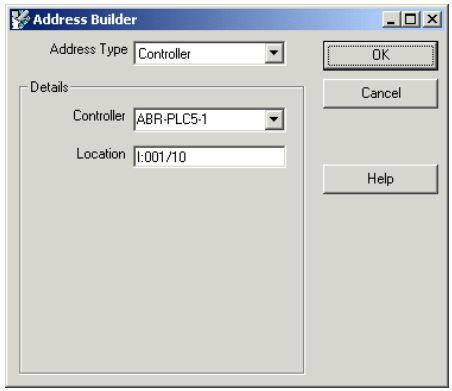

Figure 3.17 Address Builder Dialog Box

7 Click **OK** to close the Address Builder dialog box and add the address to the **PV Source Address** field on the Main tab.

8 Use the mouse to highlight all the contents of the **PV Source Address** field and press <Ctrl>+<C> to copy the address.

9 Click the Control tab to display the Control tab, and complete the fields as follows:

a) Select the **Output (OP) Source Address** field and press <Ctrl>+<V> (to paste the address from the clipboard).

b) Select the **Output (OP) Destination Address** field and press <Ctrl>+<V>.

c) From the **Scan Period** drop-down list (for **Output (OP)**) select **5** seconds.

d) From the **Number of Output States** drop-down list, select **2**.

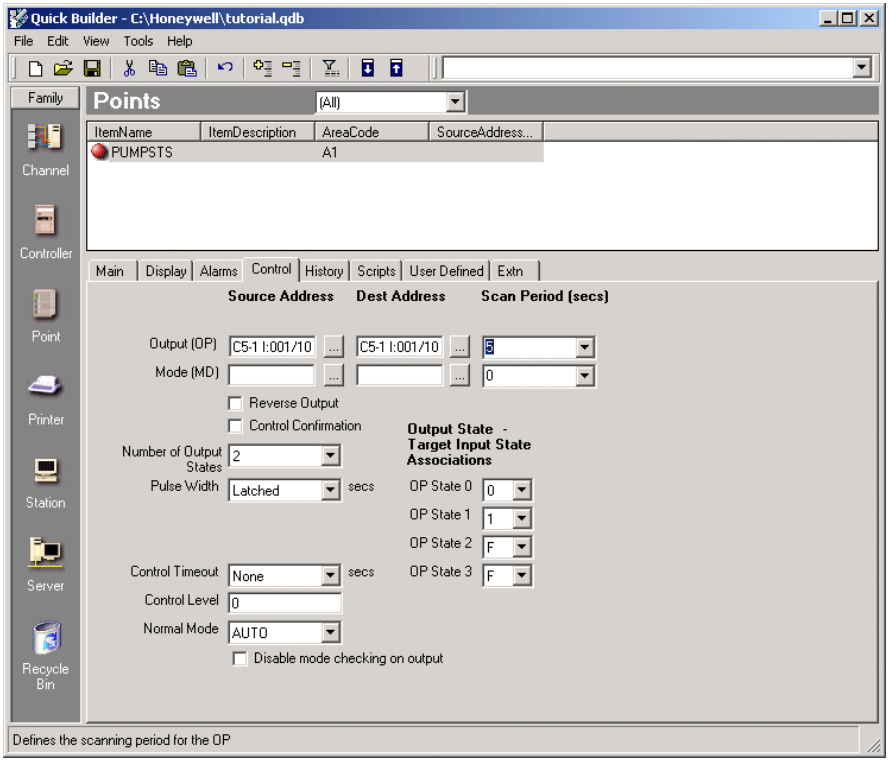

Figure 3.18 Status Point Control Tab

Defining an Analog Point to Monitor the Level of a Tank

To define an analog point to monitor the level of a tank:

1. From the **Edit** menu in Quick Builder, select **Add Item(s)**.
2. Use the fields in the Add dialog box as follows:
   a) From the **Add Items** drop-down list, select **Point**.
   b) From the list of point types, select **Analog**.
   c) In the **Number** field, leave the default selection of **1**.
   d) In the **Use Name** field, type **TANKLEVEL**.

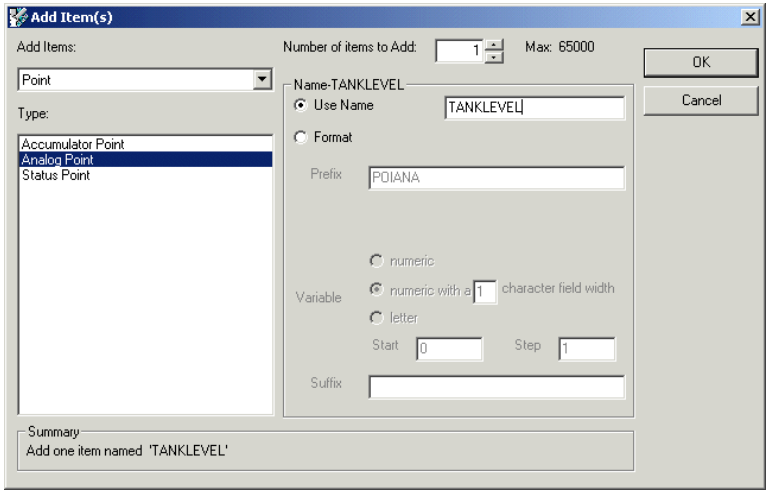

Figure 3.19 Using Add Dialog Box to Add an Analog Point

3 Click **OK**.

4 Select the point item in the item list. Click **Main** and complete the fields on the Main tab as follows.

a) In the **Description** field, type **`Input Tank Level`**.

b) From the **PV Scan Period** drop-down list, select **5** seconds.

c) In the **100% Range Value** field, type **`1000`**.

d) In the **0% Range Value** field, type **`0`**.

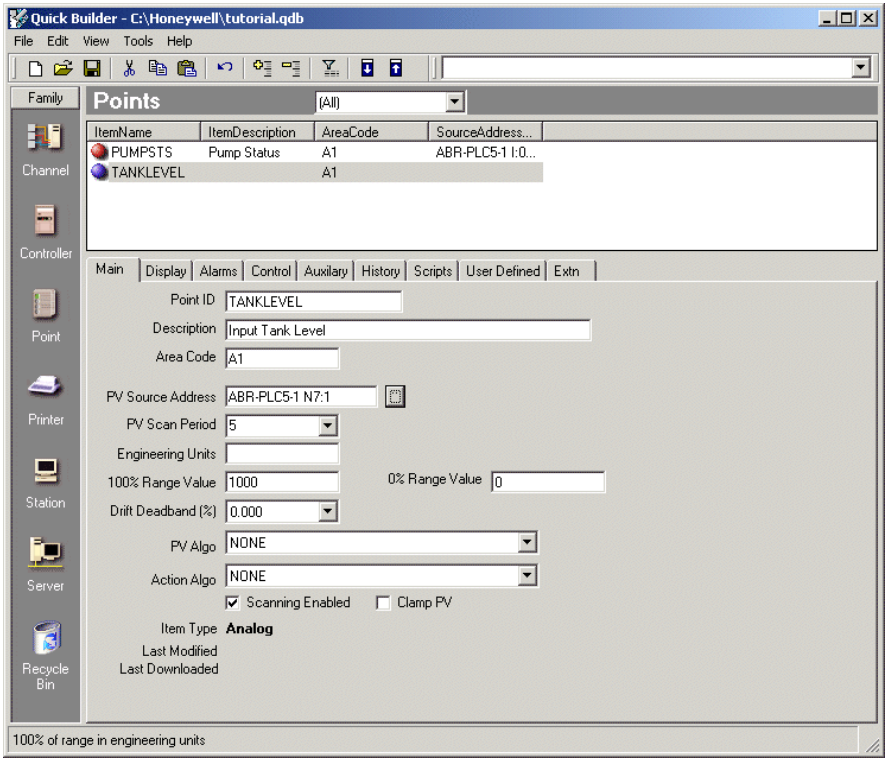

Figure 3.20 Analog Point Main Property

5 Click the **...** button next to the **PV Source Address** field.

6 Complete the fields in the Address Builder dialog box as follows:

a) From the **Address Type** list select **Controller**.

b) In the **Controller Name** field, select **ABR-PLC5-1**.

c) In the **Location** field, type **`N7:1`** as the PLC-5 integer address.

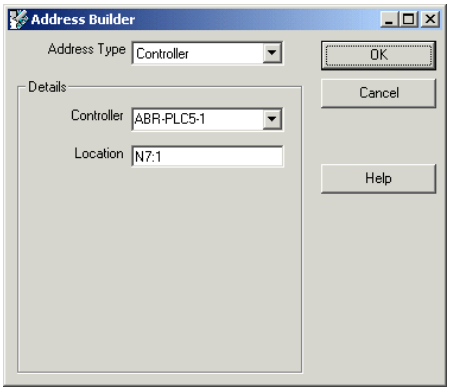

Figure 3.21 Address Builder Dialog Box

7 Click **OK** to close the **Address Builder** dialog box.

Downloading the Database

With the Stations, channels, controllers, and points defined, you are ready to download these definitions to the PlantScape server database.

To download the Quick Builder configuration data to the server database:

1 From the **Tools** pull-down menu in Quick Builder, select **Download**. This displays the Download dialog box.

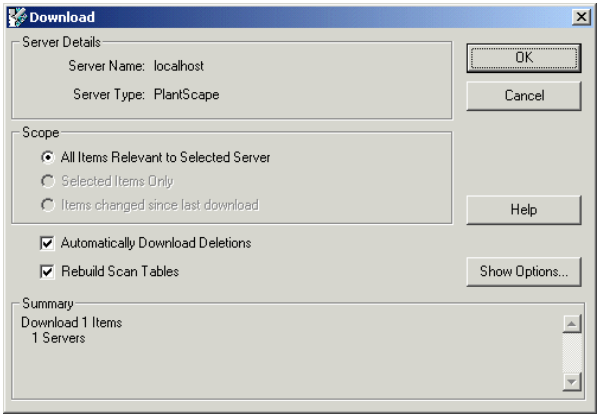

Figure 3.22 Download Dialog Box

2 From the **Scope** options, select **All Items Relevant to Selected Server**.

3 Click **OK**.

Note If you need to terminate the download, press <Esc>.

The results of the download, including any errors or warnings, are displayed on the screen after the download is complete.

Saving the File and Exiting Quick Builder

After creating and downloading the project information, you can exit Quick Builder.

To exit Quick Builder:

1. From the **File** menu, select **Save**.
   Information about the project's setup, including the current views and reports is saved to the project file `tutorial.qdb`.
2. From the **File** menu, select **Exit**.

Starting the Stations

With the PlantScape server database configured and loaded, you can now start a Station.

Starting Station on the Server

To start Station on the server computer, click the **Start** button and select **Programs ⇒ PlantScape Server ⇒ Station**.

The Station window is displayed with a "Connecting" message in the message zone (see the top left-hand corner of Station window, below the tool bar).

Starting Station on Another Computer

The procedures in this section show you how to set up Station on a different computer from the server.

Before you can set up Station on the other computer, you need to:

1. Install Windows and Station on the other computer.
2. Physically connect the computer to the server.
3. Successfully download the Quick Builder definitions to the server.

If you do not have access to another computer, you can still follow steps 2 to 6 below on the server Station to explore the Station setup features.

To define a LAN Rotary Station computer:

1. On the LAN Rotary Station computer, click the **Start** button and select **Programs ⇒ PlantScape Server ⇒ Station**.

   This starts the Station display.
2. From the **Station** menu, select **Connection Properties** to display the Connection Properties dialog box.

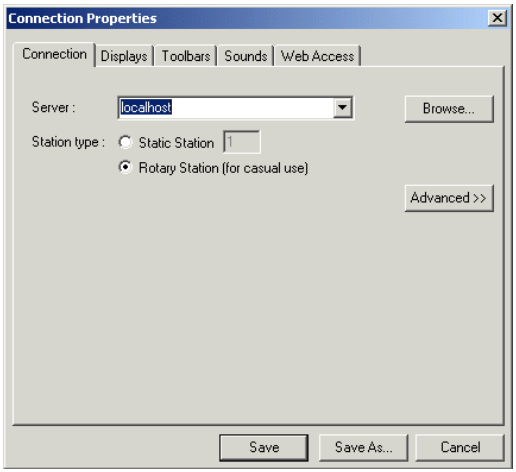

Figure 3.23 Station Setup

3 On the Connection tab in the **Server** field, enter the server name.

4 Select Rotary Station as the Station type.

5 Click **Advanced** and view the default settings.

6 Click **Save** to save these settings in the default.stn file. If you want to save the settings to another file, click **Save As** and specify a filename.

If the Station cannot connect to the server, refer to "Troubleshooting Advice" on page 531.

Configuring a Trend Set and a Group Display

This topic shows you how to configure two different types of simple standard displays. It shows you how to configure:

- A display that will enable operators to see trend data for a set of points
- An operating group so that operators can see related point data on the display

You can only configure an operating group if you are logged on to Station with a security level of SUPV or higher. If necessary, refer to "Understanding Station Security" on page 211 for information on security levels and log on procedures.

Note

- The purpose of this tutorial is to familiarize you with some standard configuration displays. You can step through the procedures for configuring the displays even if you have not yet connected any controllers to the server or downloaded your configuration data from Quick Builder to the server.
- If your server database is not yet fully operational, you will not see any operating data in the Trend Set Detail displays (for example, "Multiplot Trend Set Details Display" on page 43) and Group Detail display ("Group Detail Display" on page 47). The screen captures in this section give you an idea of what the displays would look like in a fully operational system.

Configuring a Trend Set Display

To create a Trend Set:

1 On a Station display, select **Configure ⇒ Trends and Group Displays ⇒ Trends**.

This calls up the System Configuration — Trends display.

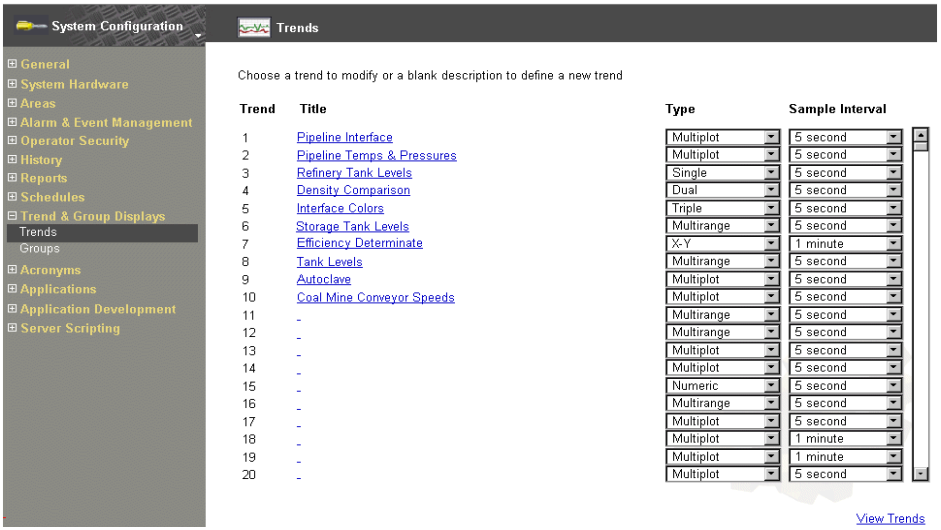

Figure 3.24 Trend Set Summary Display

2 Click the number or title of an unassigned trend set. This calls up the trend configuration display.

3 Give the trend a title by entering a description in the **Title** field. Leave the **Trend Type** at the default setting, **Multiplot**.

4 In the **Samples** field, enter a number for the number of samples to be displayed (for example, **300**).

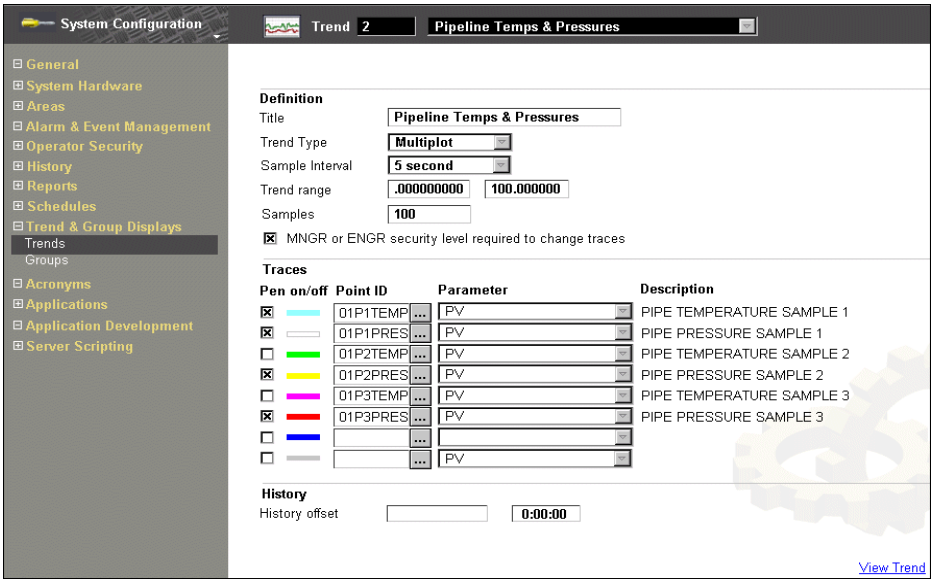

Figure 3.25 Trend Set Configuration Display

5 Click the **Sample Interval** field and select an interval from the list. (for example, 5 seconds)

6 In the first **Point ID** field, enter **PUMPSTS** (the point ID of the status point you created in 3.4.1 “Defining a Status Point to Control a Pump”).

You can enter the point ID using the Point Browser. Click the Point Browser button to call up the Point Browser. Select the required point ID and click **Apply**. The point ID is automatically entered into the **Point ID** field.

7 In the second **Point ID** field, enter **TANKLEVEL** (the point ID of the analog point you created in 3.4.2 “Defining an Analog Point to Monitor the Level of a Tank”).

8 From the **Parameter** list select the parameter you want to trend for each point.

9 To display the trace for each point, ensure that **Pen on** is enabled for each point. (The **Pen on/off** checkbox should be enabled by default, if not, click the checkbox to enable it.)

10 Select the **View Trend** link to display the trend.

Note If the **MNGR or ENGR security level required to change traces** checkbox is selected, the points you choose can only be changed by a user with `mngr` or `engr` security level.

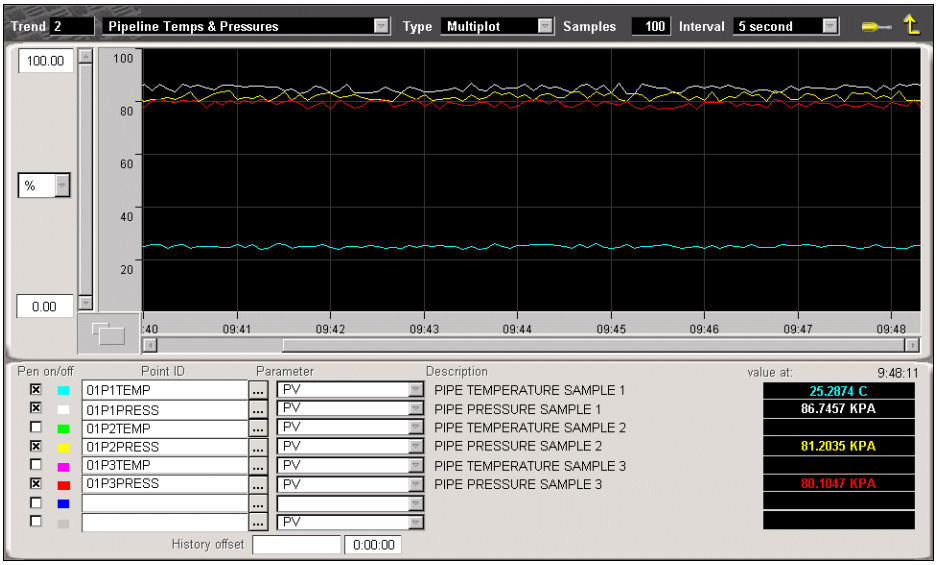

Figure 3.26 Multiplot Trend Set Details Display

Configuring Multirange Trend Set Details

If you click the **Type** combobox at the top of the Multiplot Trend Set display, you can select from a range of other types of trend set displays.

For the purposes of the next exercise, select **Multirange**.

A Multirange Trend Set is similar to a Multiplot Trend Set (as shown in “Multiplot Trend Set Details Display” on page 43) except that the range displayed for each point can be configured independently. An example of a Multirange Trend Set Details display is shown below:

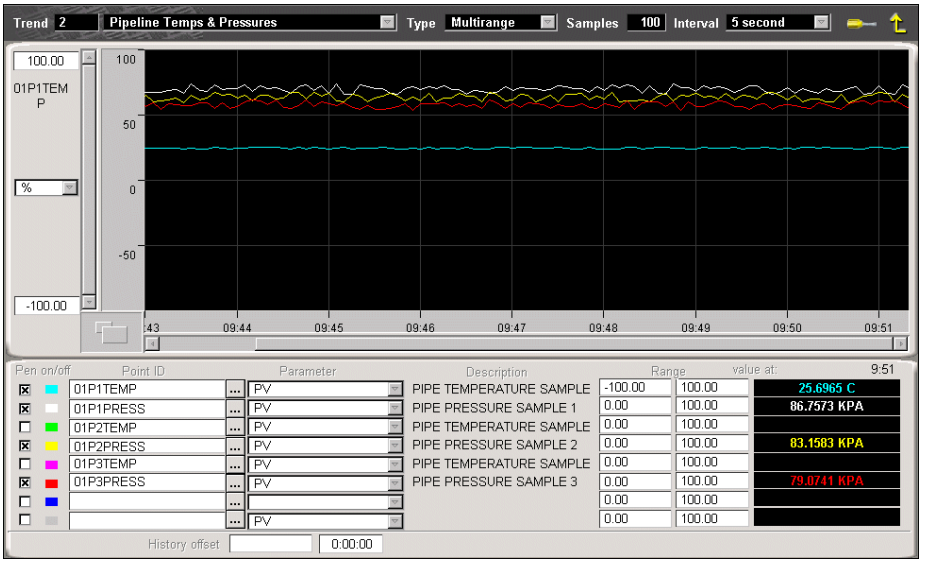

Figure 3.27 Multirange Trend Set Display

You use the Multirange Trend Set Details display to enter the trend ranges to be displayed for each point. Note that the trend ranges are only used for displaying this trend and do not affect the actual range of the point.

Configuring an Operating Group

You can configure an operating group comprising the two points you have configured in this tutorial. By defining an operating group you can view the operating data for both points from the one display.

To configure an operating group:

1 On a Station display, select **Configure ⇒ Trends and Group Displays ⇒ Groups**.

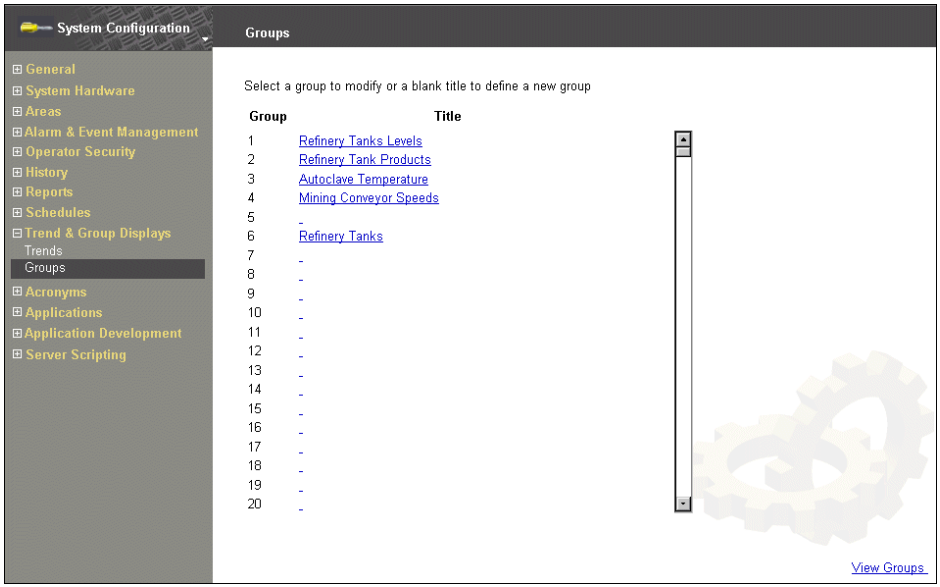

Figure 3.28 System Configuration – Groups Display

2 Click the first unassigned **Title** field. This opens the Group Configuration display.

3 Type a title for the group in the Title field.

4 Enter **TANKLEVEL** as the first point ID, and **PUMPSTS** as the second point ID and select **PV** as the parameter for each.

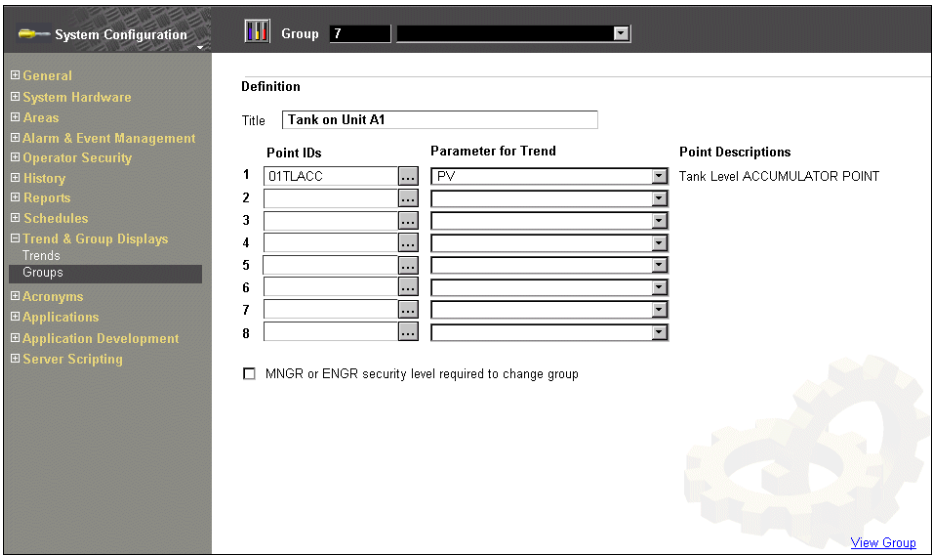

Figure 3.29 Group Configuration Display

5 Click View Group from the bottom right of the display to call up the Group Detail display for that operating group. The following figure shows how the display would look if your server were connected and operational.

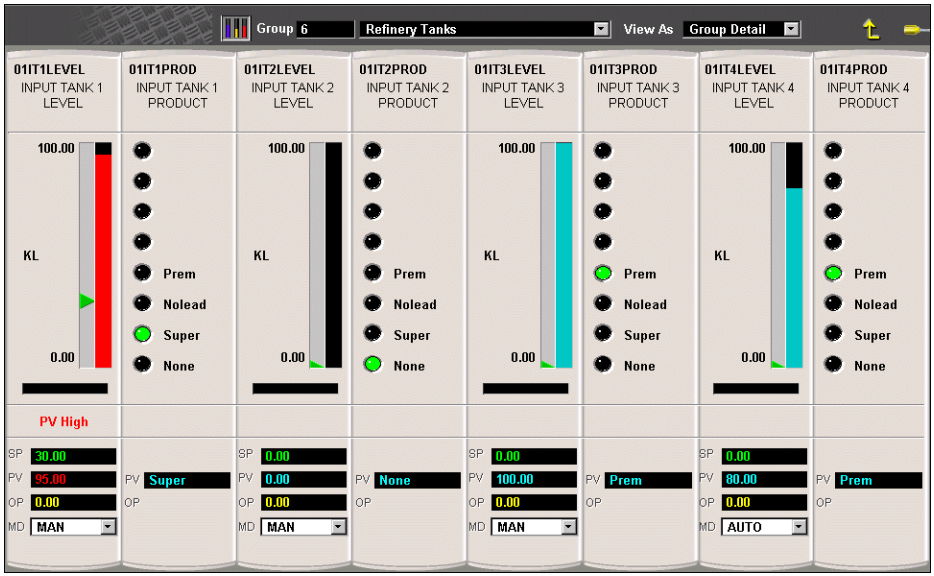

Figure 3.30 Group Detail Display

Configuring an Alarm Duration Report

This section of the tutorial shows you how to configure a simple report that generates information on the duration of alarms at given points.

You can only configure a report if you are have a security level of SUPV or higher.

To configure an Alarm Duration report:

1 Select **Configure** ⇒ **Reports** from the Station menu to call up the Reports display.

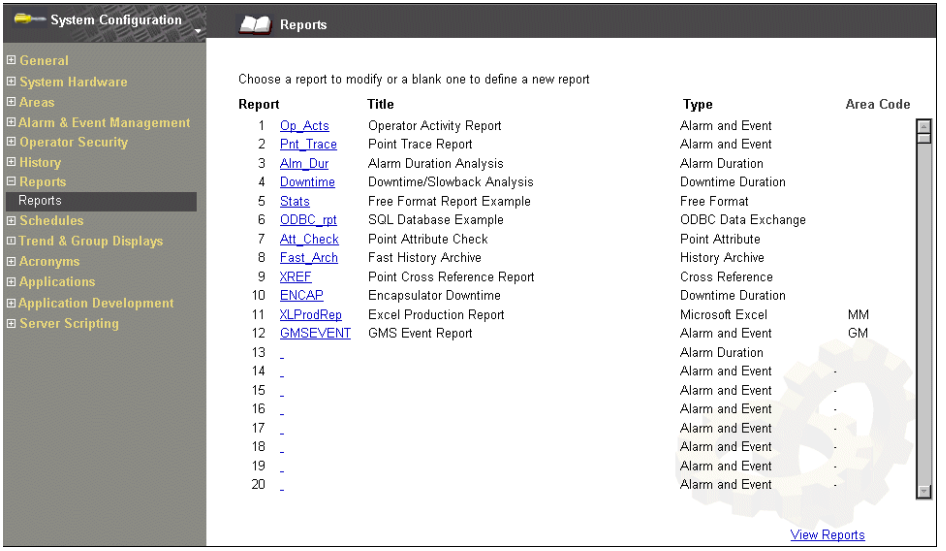
System Configuration
Reports
General
System Hardware
Areas
Alarm & Event Management
Operator Security
History
Reports
Reports
Schedules
Trend & Group Displays
Acronyms
Applications
Application Development
Server Scripting
Choose a report to modify or a blank one to define a new report
Report
Title
Type
Area Code
1 Op_Acts Operator Activity Report Alarm and Event
2 Pnt_Trace Point Trace Report Alarm and Event
3 Alm_Dur Alarm Duration Analysis Alarm Duration
4 Downtime Downtime/Slowback Analysis Downtime Duration
5 Stats Free Format Report Example Free Format
6 ODBC_rpt SQL Database Example ODBC Data Exchange
7 Att_Check Point Attribute Check Point Attribute
8 Fast_Arch Fast History Archive History Archive
9 XREF Point Cross Reference Report Cross Reference
10 ENCAP Encapsulator Downtime Downtime Duration
11 XLProdRep Excel Production Report Microsoft Excel MM
12 GMSEVENT GMS Event Report Alarm and Event GM
13 Alarm Duration
14 Alarm and Event
15 Alarm and Event
16 Alarm and Event
17 Alarm and Event
18 Alarm and Event
19 Alarm and Event
20 Alarm and Event
View Reports

Figure 3.31 Reports and History Archives Display

2 Click the first unassigned **Title** field, the **Report Definition** display is called up.

3 Select Alarm Duration from the drop-down list of Report types.

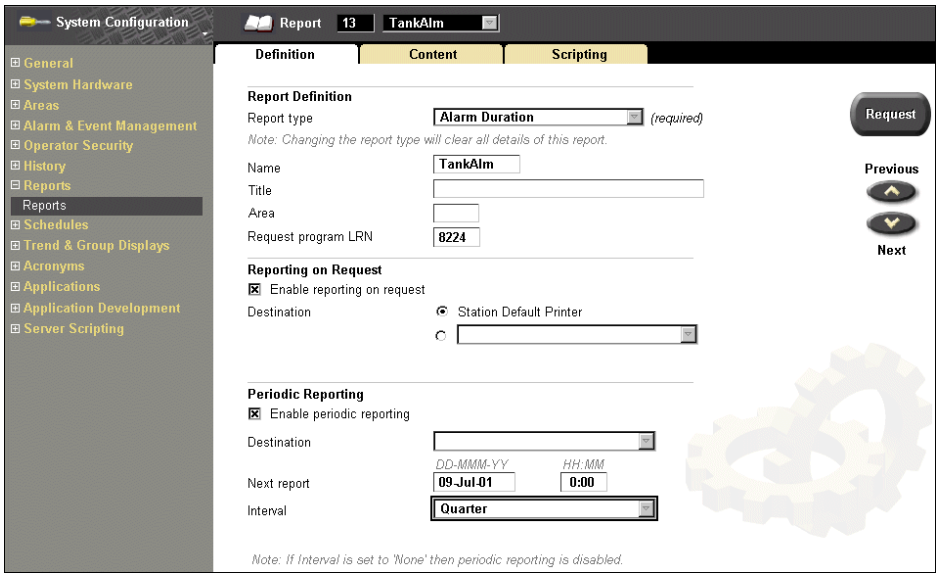

Figure 3.32 Report/Archive Definition Display

4 Enter **`TankAlm`** as the report name.

5 Enter **`Tank Alarm Duration Report`** as the report title.

6 To allow operators to request this report at any time, select the **Enable reporting on request** checkbox.

7 If you want the report to run periodically, select the **Enable periodic reporting checkbox** and specify the intervals at which the report is to be run.

8 Click the Contents tab. This displays the Alarm Duration Contents.

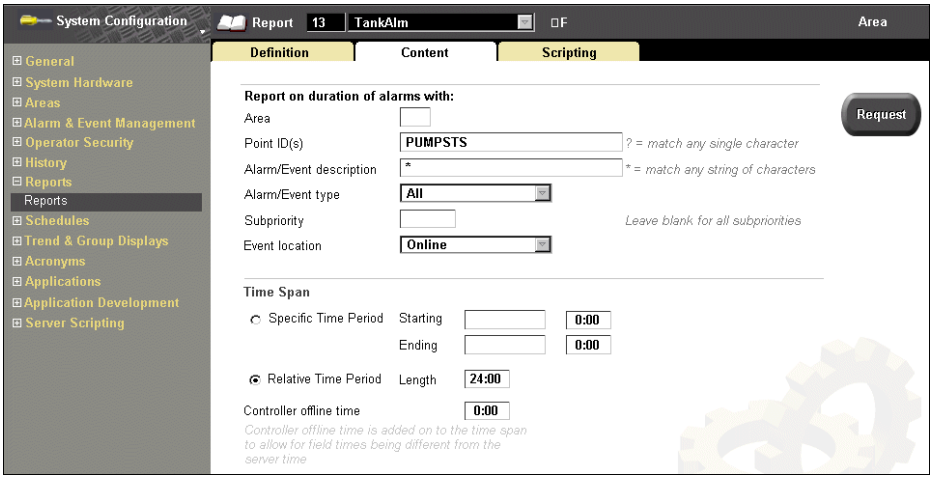

Figure 3.33 Report/Archive Content Display

9 Enter **PUMPSTS** in the **Point ID(s)** field to use the status point you defined earlier in this tutorial.

10 From the **Event type** combobox select **All** to specify that all alarms are to be included in the report.

11 If your server is fully operational you can click the **Request** button on the display to generate and display the report.

What Next?

With the Stations started, you can now explore your PlantScape system, or else move on to the configuration procedures described in the next part of this Guide.

For more detailed information on how operators use Station displays, you might want to refer to the *Operators Guide*.

If you want to create a custom graphic display for the points you have defined in this tutorial, refer to the tutorial chapter in the *Display Building Guide*.

Exiting from the Tutorial

To exit from Station and this tutorial, go to the **Station** menu and select **Exit**.

4 Using Quick Builder

Quick Builder is a tool that you can use to define and manage configuration data for Stations, printers, and controllers (other than the PlantScape Control Processors), as well as the channels for, and points on, those controllers.

This chapter contains a brief overview of Quick Builder and some operating considerations.

For More Information

The Quick Builder online help provides detailed information about both:

- Using Quick Builder
- Configuring particular controllers

Quick Builder Overview

You use Quick Builder to:

- Create an "item" for each Station, printer, and controller, as well as the channel used by each controller, and each point on the controller
- Define the relevant details of each item by completing the fields in a series of property tabs.

Quick Builder stores configuration data in a project, which constitutes an "offline database." This offline database is separate from your operating PlantScape server database. You can therefore make as many changes as you like to the Quick Builder database without affecting the live configuration data.

When you are ready, you can download all or part of the configuration data from the Quick Builder project to the PlantScape server database.

Figure 4.1, "Typical Quick Builder Window" on page 55 shows the main components of a Quick Builder window. A Project View consists of:

- An item selector in the left side of the Project View window
- An item list
- A set of property tabs for the selected point in the bottom right of the Project View window
- Toolbar
- Jumpbar
- Filter selector
- Status line

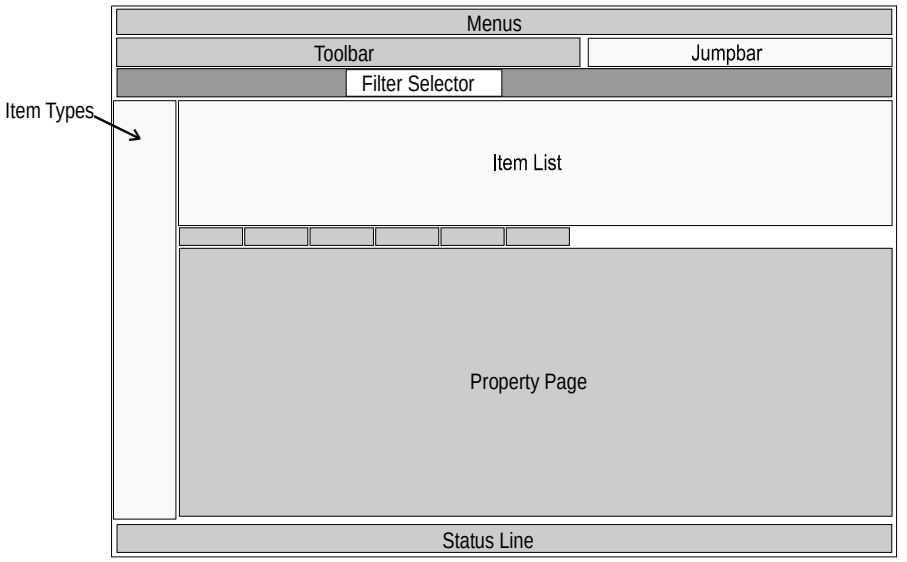

Figure 4.1 Typical Quick Builder Window

Starting Quick Builder

To start Quick Builder, on any computer where Quick Builder is installed,

- Click the **Start** button and choose **Programs** ⇒ **PlantScape Server** ⇒ **Quick Builder**.

Copying Project Files

You need to create a separate Quick Builder project file for each PlantScape server. For example, if your site is running five separate PlantScape servers you need to create a uniquely-named project file for each one, and you might call these project files `site1.qdb`, `site2.qdb`, and so on.

The quickest way to establish the project files you need is to build one, and then copy it and modify the copies as required.

Backing Up Project Files

As with any other important site data, you should back up your Quick Builder project files regularly. You can do this by using Windows Explorer to copy the `.qdb` file to an appropriate device or folder.

In addition to backing up to tape or to another drive, you might want to create backup files as you build up your configuration data, so that you can revert to an earlier version of the project file, if necessary.

5 Configuring Stations and Printers

This chapter describes how to configure Stations and printers.

To learn about	*Go to:*
Station	page 58
Printers	page 62
Setting up Station	page 63
Configuration tasks using Station	page 67

About Station

Station is PlantScape's user interface. You use Station to monitor and control your system. Station displays are used to notify operators of alarm conditions. Station works in conjunction with PlantScape, which:

- Collects data from your system and displays it in a manner that you can easily understand
- Allows you to control your system by sending appropriate commands
- Automatically performs scheduled tasks
- Notifies you of system activities, including alarms and system events
- Generates comprehensive reports

About Configuration

Once you have installed the Station software and defined a Station item in Quick Builder, you can change the default configuration of Station to your site requirements. Some of the Station settings you can configure are:

- Station connections
- Menus and toolbars
- Sounds
- Web Access
- Station Appearance

For information about configuring Station security features, such as restricting access to Stations by dividing your system into areas and using passwords for signing on to Stations, refer to "Configuring Security and Access" on page 209.

Connection Types

Stations can be connected to a server as either:

Type	***Description***
Static	Provides a permanent, dedicated link to a specific Station. This is the recommended connection type for operators.

Type	*Description*
Rotary	Provides an "as required" link to a Station. This is the recommended connection type for staff who do not use Station full-time. Rotary connections are advantageous from a licensing point of view because your license only specifies the number of simultaneously connected Stations.

Regardless of whether you define a Station as static or rotary, the maximum number of Stations that you can have connected to the server (and running the Station software) at any one time is determined by your license. If you define some of your Stations as rotary, you can install and configure a larger number of Stations in your system, but they cannot all be connected to the server simultaneously.

Connection Methods

You can set up a Station connection using one of the following methods:

Method	*Description*
Network	Connects the Station to the server via a network.
Remote Access Service (RAS)	Connects the Station to the server remotely. RAS can support connection via a modem or a serial link.

Startup Pages

You can configure the page that is displayed when a Station starts. You can specify a system-wide startup page and you can specify a different startup page for each Station.

When a rotary Station connects to the server the page that is displayed is always the page specified in the Station connection properties. If no page is specified in the Station connection properties, the page that is displayed on connection to the server is the page specified in the server wide settings.

When a static Station initially connects to the server the specified startup page is displayed. However, when Station reconnects to the server, the last display before Station shutdown is called up. The specified startup page is displayed again when the server is restarted.

Associated Stations

You can configure a Station so that the current page is "sent" for display to one of two other Stations when a special function key is used at the original Station. The Station to which the display is sent is known as an "Associated Station." You also have to configure the function key that sends the display.

Station Setup Files

When Station software is installed on a computer, two files are installed, `default.stn` and `default.stb`. These files define:

- Connection properties from Station to the server
- The general appearance of Station
- Commands on the menus and toolbars
- Function key actions

Station automatically uses default.stn unless you select another setup file. You might have several setup files for connections to more than one server, or setup files with specific user preferences.

After you have installed the Station software, the default settings contained in `default.stn` and `default.stb` can be reviewed and customized. For more information on customizing Station connections, see "Configuring Station Connections" on page 63. For information on customizing toolbars, menus and function keys, see "Customizing Toolbars, Menus and Function Keys" on page 64.

SafeBrowse

A SafeBrowse® object is a Web browser specifically designed for use with Station. This feature is useful for calling up Web pages and other files, such as Microsoft Word documents containing operating procedures.

SafeBrowse includes appropriate security features that prevent users from calling up unauthorized Web pages or other documents in Station. If you want to restrict the use of SafeBrowse, you need to specify the Web pages or documents that operators can call up.

You use the Web Access tab of the Connection Properties dialog box to configure SafeBrowse.

Customizing the Appearance and Behavior of Station

You can customize initialization parameters of Station by editing the `station.ini` file. Use a text editor to open the file in `%systemRoot%`, for example, `C:\winnt\station.ini`. For details on what you can customize see "Station.ini" on page 83.

Printers

Printers that are intended for printing reports or alarms and events are defined with Quick Builder. When you have defined your printers in Quick Builder, you assign printers to specific tasks using the Station Configuration display. For more information see “Printer Assignment” on page 81.

You can assign a printer or any printer as one of the following:

Property	***Description***
Screen dump printer	Print Station displays, such as Trend Sets and Point Detail displays.
Report printer	Print reports requested by operators, generated as a result of a status change in the system, or generated on a periodic basis.
Alarm/event printer	Prints details of alarms that are configured to print on any printers associated with Stations assigned to the area that contains the point in alarm.

Considerations

- An alarm printer needs to be a line-by-line printer, because alarms and events must be immediately available to the operator as hard copy. Laser printers are not suitable because they buffer a full page of events before printing.
- Alarm/event printers can be segregated to print alarms and events occurring in defined areas of your site. (See “Using Areas to Control Access to the System” on page 222 for details on areas.)
- Do not configure a printer as both a report printer and an alarm/event printer. Doing this causes report and alarm/event data to be mixed in together.
- When operators print displays, the screen dump is sent to the printer defined as the default printer under Windows Print Manager.
- When you configure reports, you can specify which printer is to be used for a given report.
- If you select a network printer for report printing, you must ensure that you create the network printer locally with the correct login account. See the *PlantScape Installation Guide* for details.

Setting Up Station

This section describes how to start and configure Station.

Starting Station

To start Station:

1. Click the **Start** button.
2. Select **Programs** ⇒ **PlantScape Server** ⇒ **Station**.

To use a setup file other than default.stn:

1. Select **Station** ⇒ **Connect**. The **Connect** dialog box opens.
2. Select the required .stn file from the Recent Connections tab or the Other Connections tab.
3. Click **Connect**. Station connects to the server using the connection information contained in the setup file you specified.

Configuring Station Connections

To create a new .stn file:

1. Select **Station** ⇒ **Connection Properties**. The **Connection Properties** dialog box opens (Figure 5.1, “Connection Properties Dialog Box” on page 64).

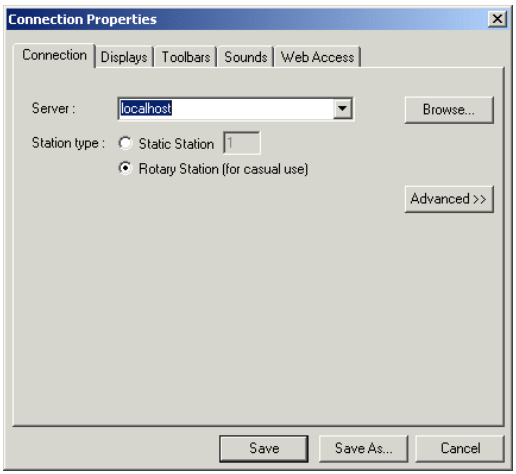

Figure 5.1 Connection Properties Dialog Box

Note The **Connection Properties** menu item might be disabled on Stations that have had the startup command line modified for security reasons.

2 Use the tabs and fields in the Connection Properties dialog box to review or modify the settings, as described in “Connection Properties Dialog Box” on page 69.

For information on customizing menus, toolbars see “Customizing Toolbars, Menus and Function Keys” on page 64

3 Click **Save** to save your changes. Use the **Save As** button and specify a new filename to save the settings to a new file.

Customizing Toolbars, Menus and Function Keys

You can customize the Station toolbar, menubar, and function keys.

To add a menu item to the Station menubar:

1 In the **Connection Properties** dialog box, click the Toolbar tab.
2 In the **Definition** field, specify the .stb file you want to customize.
3 Click **Customize**, the **Customize Toolbar** dialog box opens.
4 In the Categories list, select **Station Menubar**.
5 Click **New Command**, the **Command Properties** dialog box opens.
6 Enter the menu item name, tool tip and keyboard shortcut.

7 Select the required action from the **Action** list.

For a list of actions and required information see “Command Actions” on page 74.

8 Specify any other required information for the action you have selected.

9 The new menu item is added to the Station menubar. Click and drag the new menu item to the required position on any of the menus.

10 Click **Save As** and specify a filename to save your settings.

11 Click **Save** to save the reference to the new .stb file in the .stn file. Use the **Save As** button and specify a new filename to create a new .stn file.

To add a new menu to the Station Menubar:

1 In the **Connection Properties** dialog box, click the Toolbar tab.

2 In the **Definition** field, specify the .stb file you want to customize.

3 Click **Customize**, the **Customize Toolbar** dialog box opens.

4 In the Categories list, select **Station Menubar**.

5 Click **New SubMenu**, the **Customize Pulldown Menu** dialog box opens.

6 Enter the menu name and click **OK**. The new menu is added to the Station menubar.

7 Click **Save As** and specify a filename to save your settings.

8 Click **Save** to save the reference to the new .stb file in the .stn file. Use the **Save As** button and specify a new filename to create a new .stn file.

You can add menu items to the new menu as described in the section, “To add a menu item to the Station menubar:” on page 64.

To add a toolbar button to the Station toolbar:

1 In the **Connection Properties** dialog box, click the Toolbar tab.

2 In the **Definition** field, specify the file you want to customize.

3 Click **Customize**, the **Customize Toolbar** dialog box opens.

4 In the Categories list, select **Station Toolbar**.

5 Click **New Command**, the **Command Properties** dialog box opens.

6 Enter the toolbar button name, tool tip and keyboard shortcut.

7 Click **Change Icon** and select the required button and click **OK**.

8 Select the required action from the **Action** list.

For a list of actions and required information see “Command Actions” on page 74.

9 Specify the required information for the action you have selected.

10 Click **Save As** and specify a filename to save your settings.

11 Click **Save** to save the reference to the new .stb in the .stn file. Use the **Save As** button and specify a new filename to create a new .stn file.

To configure function keys for a Station:

1. In the **Connection Properties** dialog box, click the Toolbar tab.
2. In the **Definition** field, specify the file you want to customize.
3. Click **Customize**, the **Customize Toolbars** dialog box opens.
4. In the Categories list, select **Station Shortcut Keys**.
5. Click **New Command**, the **Command Properties** dialog box opens.
6. Enter the keyboard shortcut.
7. Select the required action from the **Action** list.
   For a list of actions and required information see “Command Actions” on page 74.
8. Specify the required information for the action you have selected.
9. Click **Save As** and specify a filename to save your settings.
10. Click **Save** to save the reference to the new .stb in the .stn file. Use the **Save As** button and specify a new filename to create a new .stn file.

To add a new toolbar:

1. In the **Connection Properties** dialog box, click the Toolbar tab.
2. In the **Definition** field, specify the file you want to customize.
3. Click **Customize**, the **Customize Toolbars** dialog box opens.
4. Click **New Toolbar** and enter the name in the **Toolbar Name** field. The toolbar is added to the Station window.
5. Click and drag the required commands from the **Commands** list to the required position on the new toolbar.
6. Click **Save As** and specify a filename to save your settings to a new file.
7. Click **Save** to save the reference to the new .stb in the .stn file. Use the **Save As** button and specify a new filename to create a new .stn file.

Using Station for Configuration

You use displays in Station to complete other configuration tasks that are not covered in Station setup or `station.ini`. You also use Station to configure server wide settings.

Configuring Timeout

To specify idle timeout and select timeout:

1. From the System Configuration Menu display, click **Server Wide Settings**. This calls up the Server Wide Settings display.
2. Enter the required timeout settings as described in "General Station Settings" on page 78.

Configuring Startup Pages

To configure a system-wide startup page:

1. From the System Configuration Menu display, click **Server Wide Settings**. This calls up the Server Wide Settings display.
2. Enter the required page number or name as described in "General Station Settings" on page 78.

To configure a startup page for a static Station:

1. In the Station Summary display, click the number or title of the Station you want to configure. This calls up the Station Configuration display.
2. Specify the required page number or name as described in "Start Up/Idle Timeout Action" on page 81.

The startup page for a rotary Station is specified on the Connections tab of the Connection Properties dialog box. For more information see "Connection Properties Dialog Box" on page 69.

Setting the Fast Raise/Lower Step

To specify the fast raise/lower step:

1. From the System Configuration Menu display, click **Server Wide Settings**.
2. In the **Fast raise/lower step** field, enter the required percentage increment/decrement as described in "General Station Settings" on page 78.

Configuring Alarms

To specify alarm settings for all Stations in your system:

1 From the System Configuration Menu display, click **Server Wide Settings**.

2 Specify the required alarm settings as described in "Station Alarm Settings" on page 79.

To define Station-specific alarm settings:

1 On the Station Summary display, click the number or title of the Station you want to configure. This calls up the Station Configuration display.

2 Specify the required alarm settings as described in "Audible Alarm/Station Failure Alarm" on page 80.

If you enable the Station failure alarm for a Station, you can also configure the priority of the Alarm.

To configure the priority of the Station failure alarm:

1 From the System Configuration Menu display, click **Alarm & Point Processing**.

2 On the Alarm Priorities tab select the appropriate priority for Station failure alarms.

Specifying Associated Stations

To configure associated Stations:

1 Configure function keys as described in "Customizing Toolbars, Menus and Function Keys" on page 64 and "Server Display Program" on page 75.

2 On the Station Configuration display specify the associated Stations as described in "Station Configuration Display" on page 80.

Connection Properties Dialog Box

You use the Connection Properties dialog box to customize some of the Station settings. The dialog box contains a series of tabs relating to the Station settings you can customize. The settings are described in the sub-topics below.

Connections Tab

You use the Connection tab in the Connection Properties dialog box to specify how the Station that you are currently using is connected to the server. The options you can specify are described below.

Tip *Click the* ***Advanced*** *button to display all properties.*

Property	***Description***
Server	Specifies if Station connects to a local or remote server. Use the Browse button to select the remote server.
Station type	Specifies if this Station is a static Station or a rotary Station. If you are setting up a static Station, specify the Station number. The number must match the Station number allocated for this Station in Quick Builder.
Use Redundant Connection	Specifies the auxiliary setup file to connect to the auxiliary server during Station Failover. Applicable if you have the redundancy option installed.
Normal update rate	The rate, in seconds, at which dynamic values on displays at this Station are updated from the database.
Fast update rate	An optional fast update rate, in seconds, that can be set by function key for displays at this Station. For information about configuring the Fast Update Rate function key, see “Keyboard Service Program” on page 89
Communications timeout	How long the Station should wait for initial communications from the server before displaying an error message.
Startup display	The number or name of the page the rotary Station is to display on connection. Enter zero to use the System Startup page.

Displays Tab

Use the Displays tab to define the paths and the order Stations uses to search for displays.

Button	***Description***
Page Background Color	Specifies the color of the background visible when you change displays.
Search for displays in	Lists the paths and the order Station uses to look for displays.
Add	Adds a search path.
Remove	Deletes the selected search path from the list.
Up arrow	Move the selected search path up within the list. The order of the display paths determines the search order.
Down arrow	Moves the selected search path down within the list.
Search subdirectories	Indicates if the folders of the specified paths are searched.

Toolbars Tab

Use the Toolbars tab to customize the menus, toolbars, and keyboard shortcuts that are available to Station.

Property	***Description***
Menu, toolbar & keyboard shortcuts	The name of the file containing the menu, toolbar, and keyboard settings.
Browse	Allows you to specify another file.
Customize	Allows you to customize the menu, toolbar, and keyboard settings.
Show message zone	Specifies whether the message zone is shown.
Show alarm zone	Specifies whether the alarm zone is shown.
Show status zone	Specifies whether the status zone is shown.
Show button labels	Specifies if the button name is displayed with the icon.
Use large buttons	Specifies if large buttons are used in the toolbar
Show ToolTips	Specifies if ToolTips are shown when you move the mouse over a toolbar button

Property	*Description*
Show shortcut keys in ToolTips	Specifies if shortcut keys are included in the ToolTip
Show keyboard shortcuts	Specifies if keyboard shortcuts are shown with the menu items. Applicable only if a shortcut is assigned to a menu item.
Show icons	Specifies if icons are shown with the menu item. Applicable only if an icon is assigned to a menu item.

Sounds Tab

Use the Sounds tab to configure audible alarms.

Property	*Description*
Use PC Speaker	Specifies if the audible alarm is generated through the speakers on the computer Station is running on.
Event	Lists the events for which you can specify alarms.
Sound	Lists the sound specified for the event.
Sound for selected event	Specify the sound you want played for a particular event.
Use external contact	Specifies if the audible alarm is generated through an external annunciator.

Web Access Tab

Use the Web Access tab to configure SafeBrowse.

Tip *Click the* ***More*** *button to display all properties.*

Property	*Description*
No URLs	No Web pages or files can be displayed in SafeBrowse.
All URLs	All Web pages or files can be displayed in SafeBrowse.
The following URLs only	Only the specified Web pages or files can be displayed in SafeBrowse.
Add	Enables you to add specific Web pages or files for display in SafeBrowse.

Property	***Description***
Remove	Removes the selected Web page or file and cannot be viewed in SafeBrowse.
SafeBrowse home page	Enables you to specify the URL of the default home page.
SafeBrowse search page	Enables you to specify the URL of the default search page.

Toolbars Dialog Box

You access the Toolbars dialog box from the Toolbar tab, in the Connection Properties dialog box.

Use the Toolbars dialog box to:

- Show or hide a toolbar
- Add a custom toolbar
- Add menu items to a menu
- Customize menu items
- Customize function keys and shortcut keys

The properties are:

Property	***Description***
Show	Specifies the toolbars to show
Toolbar name	Allows you to specify the name of a custom toolbar
New Toolbar	Allows you to add a new toolbar
Delete Toolbar	Allows you to delete a toolbar.
Categories	Lists the menubars, toolbars and shortcut keys to which you can add new commands and assign to actions.
Commands	Lists the commands or menu items available on the toolbar or menubar currently selected in the Categories list.
New SubMenu	Allows you to add a new menu to the Station menubar.
New Command	Allows you to add a new command to the selected menubar or toolbar.
Delete	Allows you to delete the selected command.
Edit Properties	Allows you to edit the selected command.

Command Properties Dialog Box

The Command Properties dialog box is used to set the properties of a command you add to the toolbar, menubar or keyboard shortcut.

Property	*Description*
Icon	The icon currently assigned to the command.
Change Icon	Enables you to specify an icon for a toolbar button.
Name	The name of the menu item, toolbar button or keyboard shortcut.
ToolTip	The text that appears when you mouse over the toolbar button.
Keyboard shortcut	The keyboard shortcut assigned to the menu item or toolbar button.
Action	The action assigned to the menu item, toolbar button, or keyboard shortcut. See “Command Actions” on page 74 for the appropriate action and required value.

Command Actions

You can specify the following actions for a menu item or toolbar button:

Action	*Required Value*
Callup Page	Page number or name.
Launch Application	The path of the executable file for the application to be launched.
All Commands	A standard command. Select the command from the list.
Request Report	The report number.
Request Task	Task number, parameters, whether the task requires input from the Command Zone. For a list of parameters for LRN 21 see “Server Display Program” on page 75.
Send Server Pushbutton	Pushbutton interrupt code. See “Pushbutton Interrupt Codes” on page 77 for the appropriate code.

Action	*Required Value*
HMIWeb Command	HMIWeb command. Select the command from the list. The HMIWeb commands are commands that apply to the display element that has focus in a HMIWeb display, or to the data source to which it is bound. Note that some of these commands are only supported by certain types of display element/data source. When a HMIWeb command is invoked, it is sent to the display element for processing. If, for example, the Raise command is invoked on an alphanumeric, the bound data source would raise the value of the point associated with the alphanumeric.

Server Display Program

The Server Display program (LRN 21) is a common program assigned to user-definable function keys. The Server Display program performs a wide range of tasks, determined by the values of parameters 1 and 2, as described in the following table.

Parameter 1	*Parameter 2*	*Action*
1	Page #	Call up the specified page number.
2	N/A	Page forward
3	N/A	Page backward
4	Record #	Display the specified record
5	N/A	Record forward
6	N/A	Record backward
7	Page #	Call up page number or name with current file and record # offset. For more information, see the display building guide.
8	Trend#	Call up the specified trend set
9	Report #	Call up the specified report detail display
10	Report #	Peruse the report output
11	1	Prompt for password entry at the Station
11	2	Prompt for page # at the Station

Table 5.1 Server Display Program Parameters and Actions

Parameter 1	*Parameter 2*	*Action*
11	3	Prompt for trend set # at the Station
11	4	Prompt for group # at the Station
11	5	Prompt for group trend # at the Station
11	6	Prompt for group history # at the Station
12	N/A	Message pad clear
13	N/A	Message pad save
14	History type#	Call up history type detail
17	N/A	Cancel
19	Associated Station number (either 1 for first or 2 for second)	Send current display to associated Station defined by parameter 2.
21	N/A	Call up the prior display
22	N/A	Cancel printing
24	N/A	Alarm silence/acknowledge
26	N/A	Control selected point to normal mode
27	N/A	Control selected status point to OFF
28	N/A	Control selected status point to ON
29	N/A	Control selected point to MAN mode
30	N/A	Control selected point to AUTO mode
31	N/A	Control selected point to CASC mode
32	N/A	Control selected point to COMP mode
37	N/A	Fast lower the selected value
38	N/A	Fast raise the selected value
39	N/A	Call up the point's associated display
40	N/A	Toggle the point's in-service status
41	N/A	Select the point's OP
42	N/A	Select the point's SP
49	Group #	Call up the operating group display
50	Group #	Call up the operating group trend display
51	Group #	Call up the operating group history display

Table 5.1 Server Display Program Parameters and Actions (Continued)

Pushbutton Interrupt Codes

Description	*Pushbutton Interrupt*	*Description*	*Pushbutton Interrupt*
Call up Channel Status Display	86	Call Up the Message Summary Display	115
Call up Station Status Display	87	Call Up the Alarm Summary Display	116
Cancel Server Printing	90	Call up page 80	119
Request the Server to Print the Display	91	Set Control to Manual Mode	121
Call Up the System Menu Display	93	Set Control to Automatic Mode	122
Enable/Disable	94	Set Control to Normal Mode	123
Group	96	Select SP	124
Detail	97	Select OP	125
Trend	99	Esc	126
Page	102	Select	127
Send current page to Assoc Stn (1 or 2?)	104	Request a Server User Task	134-143
Prior Display	106	Hit (select the nearest object)	144
Associated Display	107	Raise	148
Page Backwards	110	Fast Raise	150
Page Forwards	111	Lower	152
Enter	112	Fast Lower	154
Acknowledge/Silence	113	Refresh Window	160

Server Wide Settings

Use the Server Wide Settings display to define:

- General Station settings
- Station alarms
- Security level required for enabling and disabling hardware
- Alarm summary options

General Station Settings

Use General Station Settings on the Server Wide Settings display to specify the following:

Property	***Description***
System start up page	The default startup display: • On connection to the server and on idle timeout for rotary Stations. • On initial connection to the server for static Stations.
Select Timeout	The time, in seconds, an alphanumeric field on a Station display can remain selected before being automatically deselected.
Idle Timeout	The time, in seconds, a Station display remains active without any operator activity before reverting to the lowest level of security and (optionally) changing to a different display. For rotary Stations, the connection is closed so that it is available to another Station. Changes to the idle timeout value are not effective until Station reconnects to the server.
Fast raise/lower step	The percentage amount by which the value of a selected field can be raised or lowered in all Station displays when using the fast raise/lower function keys: Note that for Set Points (SP) and Output Values (OP) with specified limits, the Fast Raise/Fast Lower function key cannot be used to increase or decrease the field value of those points beyond their specified limits.

Station Alarm Settings

Use Station Alarms on the Server Wide Settings display to specify settings for alarms:

Property	*Description*
Audible active time	The duration of audible alarms. For example, if you specify 10 seconds, the alarms sound for 10 seconds each, unless the operator silences the alarm by acknowledging it before the 10 seconds has passed.
Audible re-alarm time	The time period after which the audible alarm sounds again after the period specified in the **Audible active time** field expires. For example, if you specify 60 seconds, an unacknowledged alarm sounds 60 seconds after it last stopped sounding, until it is acknowledged.
Alarm line shows	Specifies which unacknowledged alarm is displayed in Station alarm lines if there is more than one at the highest priority.

Enabling and Disabling Hardware

Use the Enable and Disable Hardware control to specify:

Property	*Description*
Minimum Security Level Required	The minimum security level for enabling and disabling channels, controllers, points and printers.

Alarm Summary Options

Use the Alarm Summary Options on the Server Wide Settings display to specify the following:

Property	*Description*
Enable individual alarm priority	Changes the behavior of the **High** and **All** options on the Alarm Summary.
Enable full page alarm acknowledgement	Activates a button on the Alarm and Message Summary displays that operators use to acknowledge a full page of alarms.

Station Configuration Display

You use the Station Configuration Display to define Station-specific settings.

General Tab

The following sections describe settings you define on the General Tab of the Station Configuration display.

Associated Stations

Use the Associated Stations controls to specify:

Property	*Description*
First Station	Specifies the number or name of the first associated Station.
Second Station	Specifies the number or name of the second associated Station.
Station Type	Displays the keyboard type the Station uses.

Audible Alarm/Station Failure Alarm

Use the Audible Alarm/Station Failure Alarm controls to specify:

Property	*Description*
Activate for LOW Alarms	Controls whether an audible alarm is sounded for low alarms.
Activate for HIGH Alarms	Controls whether an audible alarm is sounded for high alarms.
Activate for URGENT Alarms	Controls whether an audible alarm is sounded for urgent alarms.
Also activate when Operator is signed off	Controls whether an audible alarm is sounded
Station failure Alarm	Controls whether an alarm is generated if communication to the Station is lost.

Start Up/Idle Timeout Action

Use the Start up/idle Timeout Action controls to specify:

Property	*Description*
Start up page	Specifies the page display called up: • Each time a rotary Station connects to the server. • When a station Station initially connects to the server.
Change to start up page on idle timeout	Specifies the page number of the display to be called up on a rotary Station when the idle timeout timer for the Station expires.

Printer Assignment

Use the Printer Assignment controls to assign printers to specific tasks.

Property	*Description*
Alarm/Event Printer	Specifies the printer designated to print alarms and events.
Report Printer	Specifies the printer designated to print reports.
Print LOW alarms	Prints details of alarms for points going in and out of low priority alarm conditions.
Print HIGH alarms	Enables printing of alarms for points going in and out of high priority alarm conditions.
Print URGENT alarms	Enables printing of alarms for points going in and out of urgent priority alarm conditions.
Print EVENTS	Enables printing of alarms for points going in and out of journal priority alarm conditions and other events.
Print Operator changes	Prints all changes to points an operator has made from the Station.

Area Assignment Tab

If your system is divided into areas, use the controls on the Area Assignment tab to assign this Station to the areas where access is required.

Property	***Description***
Assigned	Indicates if the Station is assigned to an area
Restrictions	Specifies any restrictions to the level of access the Station has to the area, for example, view only access.
Area	The areas defined in the system.
Description	A description of the area.

Station.ini

You can add or change the following parameters in `station.ini` to customize the Station:

AllowRightMouseClickBrowserMenus=*n*

Controls whether the right mouse button menu is available in a SafeBrowse window. Valid values for *n* are:

0	Right mouse button menu is disabled.
1	Right mouse button menu is enabled.

ArrowKeysForNavigation=*n*

Allows the use of arrow keys to navigate around a display. Valid values for *n* are:

0	Off
1	On

AutoReconnect=*n*

Sets the number of times Station automatically reconnects after a host communications timeout without prompting the user. Valid values for *n* are:

0	None
1	1 or more

ConnectTimeout=*n*

The amount of time (in milliseconds) allowed for Station to connect to the server before the connection attempt is cancelled. The default value is 150 milliseconds.

DefaultFont=*fontname*

Controls the font used for command bar and status bar where *fontname* is any font available on the computer.

DisableEchoSafeBrowseMessage=*n*

Disables the display of download messages in the message zone when SafeBrowse is being used. Valid values for *n* are:

0	Enables the display of download messages.
1	Disables the display of download messages.

DisableMaximizeButton=*n*

Allows or prevents users from maximizing the Station window. Valid values for *n* are:

0	Users can maximize the Station window.
1	Users cannot maximize the Station window.

DisableMenuMnemonic=*n*

Disables the insertion of mnemonics in the Station menu. Valid values for n are:

0	Enables the insertion of mnemonics.
1	Disables the insertion of mnemonics.

DisableURLNavigationSubsystem=*n*

Allows or prevents the use of SafeBrowse. Valid values for *n* are:

0	SafeBrowse is enabled.
1	SafeBrowse is disabled.

DisConnectTimeout=*n*

The amount of time (in milliseconds) Station waits for disconnection acknowledgement from the Server before closing the connection. This is applicable to failover. The default value is 150 milliseconds.

FixedWindowSize=*n*

Allows or prevents users from resizing the Station window. Valid values for *n* are:

0	Users can resize the Station window.
1	Users cannot resize the Station window. This setting also ensures that a full page is automatically shown at every zoom level.

FlashWindowOnAlarm=*n*

Causes the Station taskbar icon to flash when an alarm is raised. Valid values for *n* are:

0	Off
1	On

HelpCommand=*programpath\name*

Specifies the command to invoke the operator help, where program path\name is the path and name of the help application.

HelpOperator=*filename*

Specifies the filename of the operator help.

HighPriority=*n*

Sets the priority of the Station process. Valid values for *n* are:

0	Normal priority.
1	High priority.

KeepAliveDouble=*n*

Allows Station to miss a keep alive poll. Valid values for *n* are:

0	Off
1	On

KeepAliveTimeout

The time interval at which Station sends a messages to the server and waits for a reply. If the Server has not communicated with Station before the next KeepAliveTimeout period, Station starts the failover process.

You cannot change this without coding changes to the server, see "Server Redundancy Fast Failover Configuration" on page 330.

ManualFailRetry

The number of times to retry connection to backup on manual failover.

MCISynchronization

Sends the MCI synchronization command if specified. Used by live video overlay.

MCISyncIndex

Option for MCI synchronization. Used by live video overlay.

MessageFont=*fontname*

Controls the font used to display messages where *fontname* is any font available on the computer.

MessageFontColor=*RRGGBB*

Controls the message font color. RR, GG, and BB are hex values from 00 through FF.

MessageFontSize=*nn*

Controls the message font size where *nn* is any size applicable for the font.

MessageFontStyle=*n*

Controls the message font style where valid values for *n* are:

0 = normal

1 = bold

2 = italic

3 = bold italic

ScreenWidth=*n*
ScreenHeight=*n*

Controls the Station screen resolution.

Tip *If you are using a dual monitor and want to run Station and Display Builder side-by-side, change the resolution of Station by editing station.ini and change the resolution of Display Builder by adding a registry entry using regedit.*

SocketNoLinger=*n*

Specifies whether Station issues a setsocketoption() NOLINGER when connecting to the server. This is used for non-Winsock compliant layers, for example, Novell LanWorkPlace V5.0. Valid values for *n* are:

0	Disabled
1	Enabled

StartSafeBrowseOnStartup=*n*

Enables SafeBrowse to start when Station starts. Valid values for *n* are:

0	Disabled
1	Enabled

Stdio=*n*

Enables the debug output window. Valid values for *n* are:

0	Disabled
1	Enabled

UseHandIconOnbutton=*n*

Enables the mouse pointer to be context sensitive. The mouse pointer changes to a hand icon when moved over selectable items. Valid values for *n* are:

0	Disabled
1	Enabled

`WindowsObjects=`*`n`*

Controls whether Station uses the Motif style for controls such as scroll bars instead of the Microsoft Windows style. Valid values for *n* are:

0	Station uses the Motif style.
1	Station uses the Microsoft Windows style.

Keyboard Service Program

The Keyboard Service program is a standard program that can be used for function keys. The parameter settings for Task LRN 1 are shown in the following table.

Parameter 1	***Parameter 2***	***Action***
1	N/A	Initiates the fast update as defined from Quick Builder or from Station Setup.
101 through 120	N/A	The action is defined when a display is built in Display Builder.

Table 5.2 Keyboard Service Program Parameters and Actions

6 Dividing the System into Areas

This chapter describes areas and how to implement areas in your system.

To learn about	*Go to:*
Areas	page 92
Configuring areas	page 92
Area profiles	page 93

Areas

The PlantScape database can be partitioned into areas to control access to a particular section of the plant or process. These areas might match actual physical areas or sections of a site or building.

Only Stations or operator IDs configured to have access to a given area are able to monitor (or control) points, alarms and custom displays for that area.

The PlantScape database contains a system area. System items such as printers, channels, and controllers, are automatically assigned to the system area.

Using areas is optional, unless you are implementing the Distributed Server Architecture option (see "Configuring Distributed Server Architecture" on page 335) or if you are using point servers.

Areas are identified by their 2-character area code. Each area must have a unique area code. Area codes are *not* case-sensitive; A1 and a1 represent the same area.

To use areas, you need to enable and configure areas, then ensure all points configured in the server database are assigned to an area. You assign points to an area by specifying an area code when you define the point in Quick Builder. If you leave the area code blank, the area code is assumed to be the first 2 characters of the point ID. If the first 2 characters do not relate to a configured area, you receive an illegal area code warning message.

After configuring areas for your system, you can:

- Assign points to an area by specifying the appropriate area code when you define the points in Quick Builder
- Configure area profiles (as described in "Area Profiles" on page 93)
- Assign areas to Station (as described in "Assigning Areas to Stations" on page 222)
- Assign areas to an operator ID, if you are using the Operator-Based Security option (as described in "Assigning Areas to Operators" on page 222)
- Assign areas to a report (as described in "Configuring Reports" on page 239)
- Assign areas to a custom display, if you are using the Custom Display option (as described in "Assigning Areas to Displays" on page 223)

Defining and Enabling Areas

To configure areas you need to be logged on to Station with a security level of MNGR.

To configure areas:

1. From the System Configuration Menu display, click **Areas**.
2. Click the **Enable** checkbox.
3. For Area 1:

Area Code	The 2-character code that identifies the system area.
Enable Alarms	Indicates whether or not alarms are generated for system items. Should usually be enabled.

4. For areas numbered 2 and above:

Area Code	A unique 2-character code that identifies the area.
Description	An optional description of the area.
Server	The host server for the area in a distributed server architecture, OR The point server for the area.
Enable Alarms	Indicates whether or not alarms are being generated for points in the area. For remote areas in a distributed server architecture, indicates whether or not this server is subscribed to alarms from the remote area.

The Areas display also contains links to the Station Area Assignment tab and the Operators Area Assignment tab where you can assign areas to Stations and operators.

If you choose not to assign an area, or if you want to disable an area's assignments from the alarms for any reason, clear **Enable Alarms**.

Area Profiles

An Area Profile consists of an Area List, containing one or more areas, and an Area Time Period. If you are using operator-based security, Area Profiles provide:

- Additional security, through the ability to assign areas only for specified times

- A method of giving an operator additional access at specified times. For example, after hours monitoring from a central location
- A quick way of assigning areas to operators

Tip *If you make any changes to area profiles, these changes are not available to the operator until the next time the operator logs on.*

To use Area Profiles, you need to:

1. Configure the areas in the system (see "Defining and Enabling Areas" on page 92)
2. Configure Area Lists (see "Configuring Area Lists" on page 94)
3. Configure Area Time Periods (see "Configuring Area Time Periods" on page 94)
4. Configure Area Profiles (see "Configuring Area Profiles" on page 95)

Configuring Area Lists

To configure an area list, first ensure that all the areas you want to use have been defined (see "Defining and Enabling Areas" on page 92.

1. From the System Configuration Menu display, click **Area Profiles**.
2. Click the Area List tab.
3. Click an empty row in the summary. The Area Lists configuration display opens.
4. Under Definition, enter:
   - The name you want to give the area list.
   - A description of the list.
   - The area code that must be assigned to an operator before they can view or change this area list. The area code must be configured.
5. In the lower half of the screen, select the areas that you want to include in this list.

Note The first list in the summary is a system-defined list for which all configured areas are selected. This list is supplied with the name All Areas. You can change the Name, Description, and Area Code of the All Areas list, but you cannot change the areas selected.

Configuring Area Time Periods

To configure an area time period:

1. From the System Configuration Menu display, click **Area Profiles**.
2. Click the Area Time Periods tab.

3 Click an empty row in the summary. The Area Time Periods configuration display opens.

4 Under Definition, enter:
   – The name you want to give the area time period.
   – A description of the time period.
   – The area code that must be assigned to an operator before they can view or change this area time period. The area code must be configured.

5 Select the days and enter the start time and stop time for the segments you need.

   For example, a shopping mall might have some stores that are only open from 10.00 through 19:00 from Tuesday through Sunday, a movie complex that is open from 8:00 through 24:00 every day of the year, and a supermarket that is open 24 hours a day except on two specified holidays. For this site, you might configure one area time period with three segments.

Note The first time period in the summary is a system-defined time period that includes all hours of all days. This time period is defined with the name All Hours. If you do not need to limit the hours that areas are assigned to operators, you can use this time period for all Area Profiles.

This list is supplied with the name All Hours. You can change the Name, Description, and Area Code of the All Hours Time Period, but you cannot change its Time Period Details.

Configuring Area Profiles

To configure an area profile:

1 From the System Configuration Menu display, click **Area Profiles**. The Area Profiles summary tab opens.

2 Click an empty row in the summary. The Area Profiles configuration display opens.

3 Under Definition, enter:
   – The name you want to give the area profile.
   – A description of the profile.
   – The area code that must be assigned to an operator before they can view or change this area profile. The area code must be configured.

4 The lower half of the screen provides for 16 Area List / Area Time Period pairs. Specify the pairs that you require for this profile.

Note The first profile in the summary is a system-defined profile that consists of the All Areas / All Hours pair only. An operator with this area profile has access to all areas at any time.

This profile is supplied with the name Full Access. You can change the Name, Description, and Area Code of the Full Access area profile, but you cannot change its Area List / Area Time Period details.

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7 Configuring Controllers

This chapter describes how you configure controllers in your system. It provides introductory information on controllers and channels, and shows you how to:

- Define a channel with Quick Builder
- Define a controller with Quick Builder
- Test the communications
- Monitor the status of system communications

Note The information in this chapter applies to configuring controllers other than PlantScape Control Processors. For information on configuring PlantScape Control Processors, refer to the *PlantScape Process Control Building Guide*.

About Controllers and Channels

In PlantScape, the term “controller” is the generic term for devices such as loop controllers, and so on, which are used to monitor and control one or more processes and items of field equipment.

In a PlantScape system, controllers are connected to the server so that the server can co-ordinate the monitoring and supervising of all your plant processes.

The communication links that connect controllers to the server are known as “channels.” Every controller in your system (other than the PlantScape Control Processors) must be associated with a channel. Depending on the type of controllers and the type of communications line you used to connect them to the server, you may have more than one controller on a channel. This is known as “multi-dropping.”

After installing the server software and connecting and setting up your controllers, as described in the installation guide, you need to:

1. Define your channels with Quick Builder.
2. Define your controllers with Quick Builder.
3. Download the channel and controller configuration data from Quick Builder to the PlantScape database.
4. Test the communications, as described in “Testing Communications” on page 108.
5. Enable each channel as described in “Enabling and Disabling Channels and Controllers” on page 109.

Connecting Controllers to the Server

Depending on the capability of controllers, they connect to the server in one or more of the following ways.

- LAN (Ethernet)/vendor proprietary network
- Serial line (RS-232, RS-422, and RS-485)
- Serial line to LAN using a terminal server

Details of these connections are given in the *Installation Guide* and the Controller Configuration Reference accessible via the Quick Builder online help.

Monitoring Communications

Before you start defining controllers and channels, it is useful to understand a number of concepts that are used in PlantScape to flag communications failures and help you to monitor the state of your system.

After the connections between the server and the controllers have been physically set up, defined, and enabled, the server starts to record channel and controller communications statistics. These statistics can be viewed using the channel and controller communications displays at a Station.

The server maintains the following communications statistics for each channel. If there is more than one controller on a channel, the channel values represent the sum of all of the controllers on that channel.

Total requests

Indicates the number of requests for data that have been sent to the channel or controller.

Total errors

Indicates the number of times the controller did not respond or the response was incorrect (for example, due to a bad checksum).

Barometer

Indicates the condition of the channel or controller. Every time an error occurs, the barometer is incremented by 2 or more, depending on the error. Every time a good call is made it is decremented by 1. If the number of errors is relatively large, the barometer value will tend to increase. The minimum value of the barometer is zero.

Marginal and Fail Limit Alarms

You can specify a “marginal” and a “fail” barometer limit for channels and controllers. These barometer limits work as follows.

When the barometer reaches the marginal limit, an alarm is generated and the channel or controller communication is declared to be “marginal.” If the barometer continues to increase and the “fail” limit is reached, an alarm is generated, the channel or controller communication is declared to be “failed,” and scanning of points on that channel or controller ceases. You can specify the priority of the alarms generated using the Alarm Priority tab of the Alarm & Point Processing display.

For most types of controllers, the server will try to re-establish communications every 60 seconds, using a diagnostic scan.

For some types of controllers, it is necessary to disable and then re-enable the channel or controller in order to re-establish communications after the problem has been rectified. For details of these procedures, see “Enabling and Disabling Channels and Controllers” on page 109.

Communications Redundancy

With some types of controllers, PlantScape provides the option of defining redundant communications links to provide a safety net in the event of communications link failures.

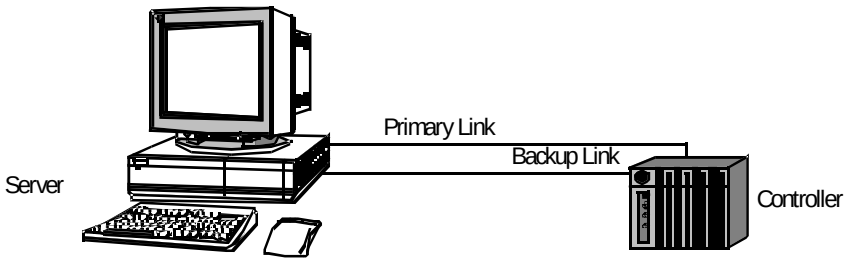


Figure 7.1 Communications Redundancy Architecture

To install redundant communications links you need to:

1. Define the redundant channels in the appropriate Quick Builder property tab for each controller.
2. On the Channel Configuration Summary, click **Show Redundant Link Status**.

Defining Channels

To define channels with Quick Builder:

1 Create a channel item for each channel in your system.

Note When you create a channel item, you need to select a controller type; for example, Allen-Bradley, LCS620, Network Node, and so on.

2 Select the channel item(s) in the item list and complete the relevant fields on each tab.

The information you need to specify depends on the type of channel. For details, see the Quick Builder online help.

Defining Redundant Communication Links

For devices that support communications redundancy, Quick Builder displays a Redundant Port tab, where you can configure the redundant link if you require it.

The fields in the Redundant Port tab are identical to those in the Port tab. However, when you first display the Redundant Port tab, it shows only the **Port Type** and **Port Name** fields. The appropriate additional fields are displayed after you select a port type. For details, see the Quick Builder online help for the device.

Configuring Stallion EasyConnection Adapter Channel

The Stallion EasyConnection Adapter is suitable for use with RS-232, RS-422, and RS-485 serial devices. Make a note of which logical Windows ports relate to which physical ports on the Stallion EasyConnection board.

To build a channel using the Stallion EasyConnection ports, first use Quick Builder to create a new channel of the correct device type.

Configure the port for the channel as if the Stallion EasyConnection port were a standard Windows serial port.

Example To use the port configured as “COM8”, you would enter the following settings under the Port tab for your channel:

Port Type	`Serial`
Serial Port Name	`COM8`

Set the other communication parameters such as Baud Rate to the appropriate values for your device.

Setting Flow Control

Because of limitations on how quickly they can process serial data, some computers and other devices implement flow control strategies to ensure that data is neither received nor transmitted at a rate faster than the device can process. Flow control is also used by industrial devices to interface with modems or half-duplex radio systems. Flow control strategies are also known as “handshaking”.

For controllers, flow control is usually only required when communicating through a half-duplex radio link or a modem connected to the device. Flow control is necessary for half-duplex radio systems to ensure that the radio link is “keyed” to receive or transmit data in the correct direction. Note that cabling requirements for devices that use flow control and those that do not are different. See “Cabling for Stallion EasyConnection” on page 104.

With the Stallion EasyConnection Serial Adapter different ports can be configured to use different flow control strategies. Before using the Stallion EasyConnection Serial Adapter, find out what flow control strategies are used by your devices, including any intervening modems or half-duplex radio systems.

Software Flow Control (XON/XOFF)

Software flow control uses special characters in the data stream to control the transmission and reception of data. These characters are called “XON” and “XOFF”. Because they interfere with the data flow, these characters should not appear in the normal data transmitted in the data stream. XON/XOFF flow control is therefore normally used only to transmit ASCII characters. Transmission of ASCII characters ensures that the XON and XOFF characters will not appear within the normal data stream. Software flow control is also called XON/XOFF handshaking.

It is possible to use software flow control in addition to hardware flow control, but this is very uncommon.

To configure your channel to use software flow control, on the Quick Builder Port tab for serial ports, choose either Input or Output from the XON/XOFF list:

- **Input** uses XON/XOFF to control the flow of data on the receive line
- **Output** uses XON/XOFF to control the flow of data on the transmit line

RS-232 Hardware Flow Control (RTS/CTS)

Hardware flow control uses specialized RS-232 lines of the serial cable to determine whether the device is ready to process incoming data. These lines are called RTS (Request to Send) and CTS (Clear to Send). This form of flow control is often called RTS toggle/CTS handshaking.

Using this form of flow control, the server will raise the RTS line when it wants to transmit data. The device will raise its CTS line when it is ready to receive data. When both the RTS and CTS lines are raised, the server will transmit data. Once the server has finished sending data, it will lower the RTS line. The device will then lower its CTS line. The device might also lower its CTS line if its input buffer becomes full. If this occurs the server will stop transmitting data and will wait until the device raises its CTS line again before recommencing transmission. Hardware flow control has special cabling requirements. Please see “Cabling for Stallion EasyConnection” on page 104 more details.

To configure your channel to use hardware flow control, on the Quick Builder Port tab for serial ports, ensure **Enable RTS/CTS** flow control is selected.

Note Because hardware flow control uses special RS-232 lines, this type of flow control is unavailable for RS-422 and RS-485 communications.

The following timing diagram shows how this works with a radio system.

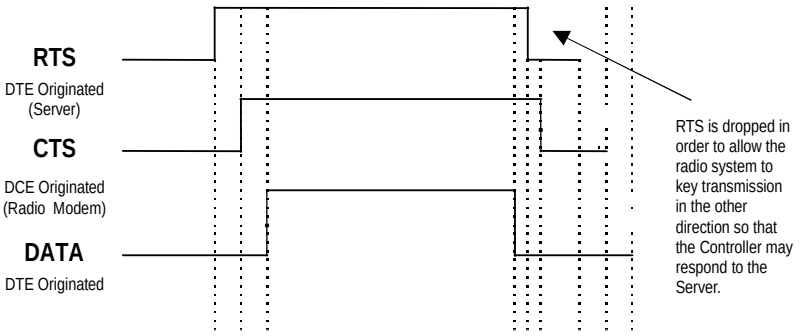

RTS
DTE Originated
(Server)
CTS
DCE Originated
(Radio Modem)
DATA
DTE Originated
RTS is dropped in order to allow the radio system to key transmission in the other direction so that the Controller may respond to the Server.

Figure 7.2 Timing Diagram for RTS/CTS Flow Control

RS-232 Modem and Radio Link Support

Some devices, such as modems and radio links, are limited not only by the rate at which they process data, but by whether their links (radio or telephone) are currently good. These devices sometimes use extra RS-232 lines to signal whether the device has a good connection.

Modems typically use DCD (RLSD) to signal that they have a good connection. Other devices sometimes use DSR. The server can be configured to watch either or both of these lines. If the lines go down, the channel will fail.

To configure your channel to use these settings, on the Quick Builder Port tab for serial ports, ensure the appropriate Detect DCD or Detect DSR is selected.

Cabling for Stallion EasyConnection

RS-232 Requirements

Most devices have their own particular RS-232 cabling requirements. Refer to the documentation for your device to determine how to wire your RS-232 cable.

The lines from the Stallion EasyConnection board use the standard RS-232 pin assignments. The following table lists the standard RS-232 pin assignments.

Pin Number	*Data Line*	*Description*
1	Shield	Signal Shield
2	TXD	Transmit serial data

Table 7.1 Stallion RS-232 Pin Assignments

Pin Number	*Data Line*	*Description*
3	RXD	Receive serial data
4	RTS	Request to Send
5	CTS	Clear to Send
6	DSR	Device (DCE) ready
7	GND or COM	Signal common (ground)
8	DCD or RLSD	Carrier Detect
20	DTR	Server (DTE) ready
22	RI	Ring Indication

Table 7.1 Stallion RS-232 Pin Assignments (Continued)

RS-422 Requirements

There are no special settings required in Quick Builder for a RS-422 setup. The following figure shows the wiring requirements.

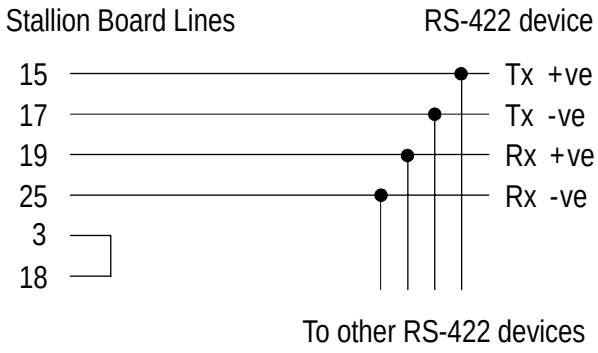


Figure 7.3 RS-422 Wiring Diagram

RS-485 Port Configuration and Wiring Requirements

To use the Stallion EasyConnection board with RS-485, select **Enable Stallion RS-485 Half Duplex** on the serial port tab for the channel properties in Quick Builder.

4-wire configuration

To use the Stallion EasyConnection board with a 4-wire RS-485 configuration, do not select **Echo (Required for Stallion RS-485 ports)** on the serial port tab for the channel properties in Quick Builder.

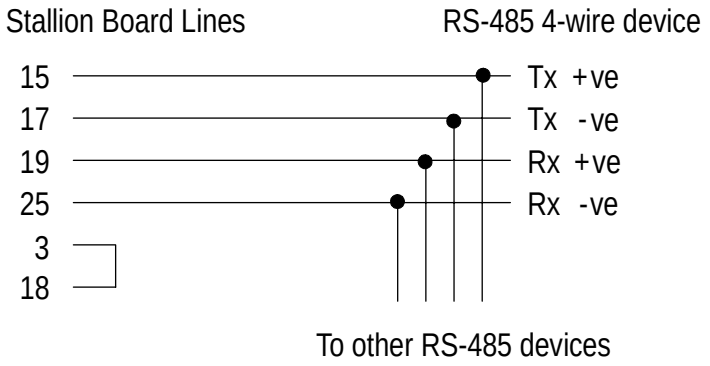


Figure 7.4 RS-485 Wiring Diagram for 4-wire Configuration

2-wire configuration

To use the Stallion EasyConnection board with a 2-wire RS-485 configuration, select **Echo (Required for Stallion RS-485 ports)** on the serial port tab for the channel properties in Quick Builder.

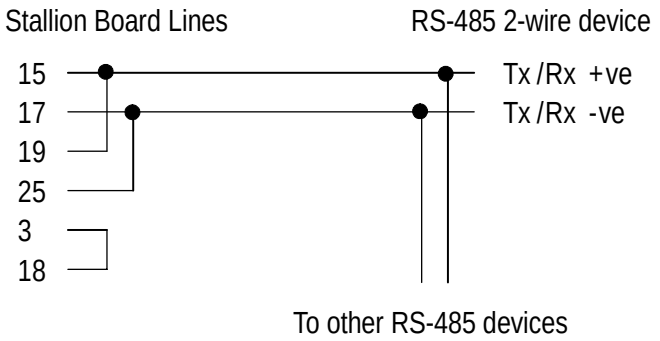


Figure 7.5 RS-485 Wiring Diagram for 2-wire Configuration

Defining Controllers

You define controllers with Quick Builder:

1. Create a controller item for each controller in your system. Note that when you create a controller item, you need to specify the controller type; for example, an Allen-Bradley, a Series 9000, and so on.
2. Select one (or more) of the controller items in the item list and then complete the relevant fields on each tab. For more information, see the Quick Builder online help.

Testing Communications

It is important to resolve any connection problems before starting to define points.

After downloading the channel and controller definitions from Quick Builder to the server database, you can test the communications between the server and the controllers by running the special test utilities that come with PlantScape.

To run a test utility, click **Start** and select **Programs ⇒ PlantScape Server Diagnostic Tools**, and then choose the utility from the cascading list.

The test utilities for controllers supported by PlantScape are described in the online controller reference information that comes with Quick Builder.

Enabling and Disabling Channels and Controllers

After you have downloaded the channels and controllers to the server, you need to "enable" them so that the system can send and receive data.

To enable or disable channels and controllers, you need to be using Station with a security level of SUPV or higher. Security levels are described in "About Security Levels" on page 212.

Enabling a Channel

To enable a channel:

1. Call up the System Status–Channels display as follows. Either:
   - Select **View ⇒ System Status ⇒ Channels** from the Station menu bar
   - Press <F1> to call up the System Menu display, and then click **System Status**. When a display opens, click the **Channels** tab.
2. By default, all channels are initially disabled. To enable a channel, select its **Enable** check box.

   Note The **Hiway** column in the System Status–Channels display only applies to channels for TDC 3000 Data Hiway controllers.

If you have defined redundant communications links (as described in "Communications Redundancy" on page 100), the System Status–Channels display works like the display for a single link, except that there are two lines of information for each channel: one for link A, and one for link B.

Enabling a Controller

To enable a controller:

1. Call up the System Status–Controllers display as follows. Either:
   - Select **View ⇒ System Status ⇒ Controllers** from the Station menu bar,
   - Press <F1> to call up the System Menu display and click **System Status**. When a display opens, click the **Controllers** tab.
2. By default, all controllers are initially enabled.

   To disable a controller (for example, if you need to take it out of service), click the **Enable** check box to change it from checked to unchecked.

   Note The **Hiway** column is applicable only to TDC 3000 Data Hiway controllers.

If you have defined redundant communications links (as described in “Communications Redundancy” on page 100), the System Status–Controllers display works like the display for a single link, except that there are two lines of information for each controller: one for link A, and one for link B.

Monitoring the Status of Communications in Your System

You can monitor your PlantScape system communications by checking on the status and error statistics of each channel and each controller in your system.

Channel Status and Error Statistics

To view status and error statistics information:

1. Call up the System Status–Channels display as described in "Enabling a Channel" on page 109.
2. To view the status and error statistics of an individual channel, click its name. This displays the Channel Status Detail display for the selected channel.

The Channel Status Detail display shows the current status of the selected channel and a range of error statistics as described in "Monitoring Communications" on page 99.

If you have defined redundant communications links for any of your channels, the Channel Status Detail display works like the display for a single link, except that there are two columns of information: one for link A, and one for link B.

Controller Status and Error Statistics

To view the status and error statistics of a controller:

1. Call up the System Status–Controllers display as described in "Enabling a Controller" on page 109.
2. Click the number or name of a controller. This displays the Controller Status display for the selected controller.

The Controller Status Detail display shows the current status of the selected controller and a range of error statistics as described in "Monitoring Communications" on page 99.

If you have defined redundant communications links for any of your controllers, and you have enabled the Redundant Communications Links displays (as described in "Communications Redundancy" on page 100), the Controller Status Detail display works like the display for a single link, except that there are two columns of information: one for link A, and one for link B.

Viewing Channel and Controller Configuration Information

You can call up System Configuration displays to view information about the channels and controllers that have been defined and enabled for your system.

Viewing Channel Configuration Summary

To call up the System Configuration–Channel summary display, which lists all the channels configured for your system, either:

- Select **Configure** ⇒ **System Hardware** ⇒ **Controller Interfaces** ⇒ **Channels** from the Station menu bar.
- Press <F1> to call up the System Menu display, and click **System Configuration**. From the System Configuration Menu display click **Channels** in the navigation panel.

To call up the Channel Configuration display for a channel, click its number or title in the System Configuration–Channel display.

Note

- The **Hiway** identifier applies only to channels for TDC 3000 Data Hiway controllers.
- The **Enable Hiway Switching** checkbox under **TDC Channel Options** only applies to channels for TDC 3000 Data Hiway controllers. The checkbox is used to enable and disable automatic switching by the server to the backup TDC 3000 Data Hiway when the channel fails. See the online reference module for the TDC 3000 Data Hiway controller interface for more details.

Viewing the System Configuration–Controllers

To call up the System Configuration–Controllers display, which lists all the controllers defined to your system, either:

- Select **Configure** ⇒ **System Hardware** ⇒ **Controller Interfaces** ⇒ **Controllers** from the Station menu bar.
- Press <F1> to call up the System Menu display, and click **System Configuration**. On the System Configuration Menu display click **Controllers** in the navigation panel.

For each controller in your system, the System Configuration–Controllers display shows:

- Whether or not the controller is enabled
- The channel number
- The Hiway identifier (only applicable to TDC 3000 Data Hiway controllers)
- The controller ID

This information is also available on the System Status–Controllers display, and you can enable or disable controllers on both displays.

The **Configuration Upload** and **Configuration Download** columns only apply to TDC 3000 Data Hiway or UDC controllers, and are described in the individual controller configuration reference guides.

Viewing Details of Points on a Specific Controller

After you have defined your points to the system, you can click **View Points** to display a list of the points defined for a specific controller in the server database.

The points listed are those that have an address that refers to a real location within the controller. Points that have been associated with the controller for scanning purposes, but have addresses that reference other points or locations in the database, are not included.

Viewing Controller Configuration Details

To view detailed configuration and status information about a specific controller:

1. Call up the System Status–Controllers display by following the instructions in "Enabling a Controller" on page 109.
2. Double-click the name of a controller listed in the display. This opens the Controller Status Detail display for that controller.
3. Double click the controller number. This opens the Controller Configuration Detail display for that controller.

8 Configuring Points

The information in this chapter applies to configuring points on controllers other than PlantScape Control Processors. For information on points on PlantScape Control Processors, refer to the *PlantScape Process Control Building Guide*.

This chapter provides an overview of the different types of points you can configure and how they can be used.

This chapter also includes tips and procedures for sites that have very complex and sophisticated monitoring and control requirements.

This chapter assumes that you have:

- A basic understanding of the accumulator, analog, and status point types and how they are used in PlantScape. (If not, you should read the general information about points in the Overview and Planning documentation before continuing with the procedures in this chapter.)
- Followed the instructions in "Configuring Stations and Printers" on page 57 and "Configuring Controllers" on page 97 for configuring your controllers and channels.

About Points

The PlantScape server uses “points” to store information about a field value or device, for example, the state of a pump, a temperature sensor, the process variable of a control loop, and so on.

PlantScape records each significant change in the values for a point as an event, which operators can see on the Event Summary display. Point events are also treated as alarms, for which you can configure a priority that controls whether the event is included in the Alarm Summary. For more information about point events and alarms, see “Defining Events, Alarms, and Alarm Priorities” on page 162.

As with the configuration of the hardware items, the key component of point configuration involves using Quick Builder to define the necessary details to the server database.

Depending on your data acquisition and control requirements, you might only need to define very simple points. For example, you might only need to define points that are going to be used in simple processes or applications, such as monitoring an oven temperature or monitoring the state of a pump.

On the other hand, your data acquisition and control requirements might be more sophisticated. For example, you might want to use a point to:

- Monitor and control a process
- Generate an alarm
- Collect historical data
- Start an application, and so on
- Run a server script to perform a task on point change
- Or you may be using a point server interface that uses flexible points that directly maps the field point object to a server point.

Regardless of how simple or complex your points might be, the procedure for configuring points can be reduced to the following steps:

Points on PlantScape Control Processors

For points on PlantScape Control Processors, you use:

1. The Process Control Building software to configure your control strategies, as documented in the *PlantScape Process Control Building Guide*.
2. Control Builder to create any scripts you want to run when the point changes.

3 Station to configure the history collection for PlantScape Control Processor point, as described in “Viewing History Collection Configuration” on page 169 of this chapter.

Points on Other Types of Controllers

For points on other types of controllers (for example, Allen-Bradley, TDC 3000 Data Hiway, Series 9000 and so on):

1 Use Quick Builder to create each point item and define its properties.

2 Download the point definitions to the PlantScape server.

Point Types

PlantScape provides the following *standard* point types, which have fixed data structures:

Type	***Description***
Status	Represents digital inputs or outputs. For example, the on and off states of a pump or light.
Analog	Represents continuous values. For example, pressures in a boiler or temperatures in a blast furnace.
Accumulator	Represents total values. For example, the volume of water that has flowed into a tank or through a turbine.

PlantScape also provides the following point types:

Type	***Description***
Database	A standard point that accesses data from parameters of other points, or from user files. See “Database Addresses” on page 179.
Container	A point that ties together a set of related standard points so that you can manage them as if they were one point. A container point is, in effect, a user-defined point type that matches your data requirements for a particular device type or scenario. For more information, see “Template Displays and Container Points” on page 237.
Flexible Point	A point that is accessed via a point server (other than the CDA server). The format of the point is determined by the point server, not by PlantScape. For more information about configuring flexible points, see “Point Servers” on page 119 and the documentation supplied with your field device.
CDA	A PlantScape Process point, which is accessed via the CDA Server.

Point Servers

A *point server* is a software component that interfaces between a PlantScape Server and devices and channels that are represented in PlantScape as flexible points.

This section discusses configuration issues in PlantScape that apply to any point server. For information about a particular point server, see the documentation supplied with the field devices represented within it.

The point server is responsible for servicing requests from PlantScape for named point parameter data (data that is referenced with ASCII names) and for notifications (alarms, events, messages and delays). The point server maps these requests to a device-specific protocol and communicates with individual devices to satisfy the requests.

You can run a point server on the same computer as the PlantScape Server, or on a separate computer. You can run more than one point server on a computer, but each point server communicates with only one PlantScape Server.

Point servers read data directly from the field. The value of a flexible point is not stored in the server unless the point is configured in history collection. When a display containing the flexible point is called up, the server creates the point if it does not already exist. The point's parameter values are read from the field via the point server, and then shown on the display. Parameter values are updated and cached by the server for a configurable period after a point is accessed, so that the next time is accessed the updated value is immediately available.

Flexible points can be added to groups, trends, point control schedules, reports, and displays.

Considerations

- Flexible points do not support algorithms. A derived server database point must be used whenever a server algorithm is required to be configured on a flexible point parameter.
- Flexible points are not processed by the PlantScape Server's alarm subsystem. For most point servers this is not an issue, because the controller or point server generates alarms on the point. However, if you are using a point server interface that does not support alarming, you must use derived server database points to do the alarming. See the reference for the particular point server for more information.
- If you are using point servers, you need to enable areas on your system.

Main Properties

This section describes the main properties of PlantScape points. Some properties are common to all point types, and some are specific.

The main properties that are common to all point types are:

Property	***See...***
Point ID:	"Point ID" on page 121.
Description:	"Description" on page 122.
Area Code:	"Area Code" on page 122.

The main properties common to status, analog, and accumulator points are:

Property	***See...***
PV Source Address:	"Source and Destination Addresses" on page 144.
PV Scan Period:	"Source and Destination Addresses" on page 144.

The main properties specific to Status Points are:

Property	***See...***
Number of States:	"Number of States" on page 124.
State Descriptors:	"State Descriptors" on page 124.
Scanning Enabled:	"Building Points Off-Scan" on page 181.

The main properties specific to Analog Points are:

Property	***See...***
Engineering Units:	"Engineering Units" on page 127.
Range High Value and Range Low Value:	"Range High Value and Range Low Value" on page 127.
Drift Deadband:	"Drift Deadband" on page 127.
Clamp PV:	See "Clamp Point" on page 128.

Property	***See...***
Scanning Enabled:	See “Building Points Off-Scan” on page 181.

The main properties specific to Accumulator Points are:

Property	***See...***
Engineering Units:	“Engineering Units” on page 132.
Range High Value:	“Range High Value” on page 133.
Rollover Value:	“Rollover Value” on page 132.
Scale Factor:	“Scale Factor” on page 133.
Meter Factor:	“Meter Factor” on page 133.
Scanning Enabled:	“Building Points Off-Scan” on page 181.

The main properties specific to Container Points are:

Property	***See...***
Template Display	See the Quick Builder online help.
Template Type	See the Quick Builder online help.

Point ID

When the point item is created, it is given a unique name, for example, POINT01, POINT02, and so on. This identifier, known as the point ID, is used in PlantScape whenever it is necessary to refer to a point in the server (for example, on a custom display or in a report). Point IDs are also sometimes known as “tags” or “tag names.”

Point IDs can be up to 16 characters long, and they must contain at least one alpha character; for example, `FIC123`. Do not use spaces, tabs, periods (full stops), or commas. Point IDs are *not* case-sensitive; POINT01 and point01 represent the same point.

If you will use this point in a recipe, the first two characters of the point ID must be the descriptor of the unit that contains the point. For details about Recipes and units, refer to “Configuring Recipes” on page 365.

If the PlantScape Distributed Server Architecture option is installed, the point ID of any point that will be accessed from another server must be unique across all servers.

Description

Use the **Description** to provide more detailed identifying information about the point; for example, “Number 3 blast furnace”. This description is often displayed in conjunction with the point ID on a Station display to help identify the equipment or the types of values that this point is to monitor or control.

Area Code

The **Area Code** indicates that this point is assigned to a specific area at your site. Areas are used to enhance the security of your system. In a distributed server architecture, any point that can be accessed by more than one server must be assigned to an area.

For more information about areas and how they are used in PlantScape, see “Using Areas to Control Access to the System” on page 222 and “Configuring Distributed Server Architecture” on page 335.

Scanned Point Parameters

The main point parameters are process variable (PV), output (OP), set point (SP) and mode (MD). See Table 8.1, “Summary of Point Parameter Types,” on page 134 for a list of all parameters and the point types that can use them.

PlantScape can store and manage multiple values in the one point. You can therefore use a single point to monitor and control a complete control loop. In many cases, however, the only parameters of a point that need to be configured are:

- The PV which shows the current value of a given location within a controller
- An OP used to reset or control a value

The names of the parameters reflect their most common usage. They can, however, be used to hold any controller values.

Status Point Parameters

A status point can access three types of field values:

- Process Variable (PV)
- Output (OP)
- Mode (MD)

Figure 8.1, “Status Point Representing a Pump” on page 123 shows the relationship between a field value and a status point.

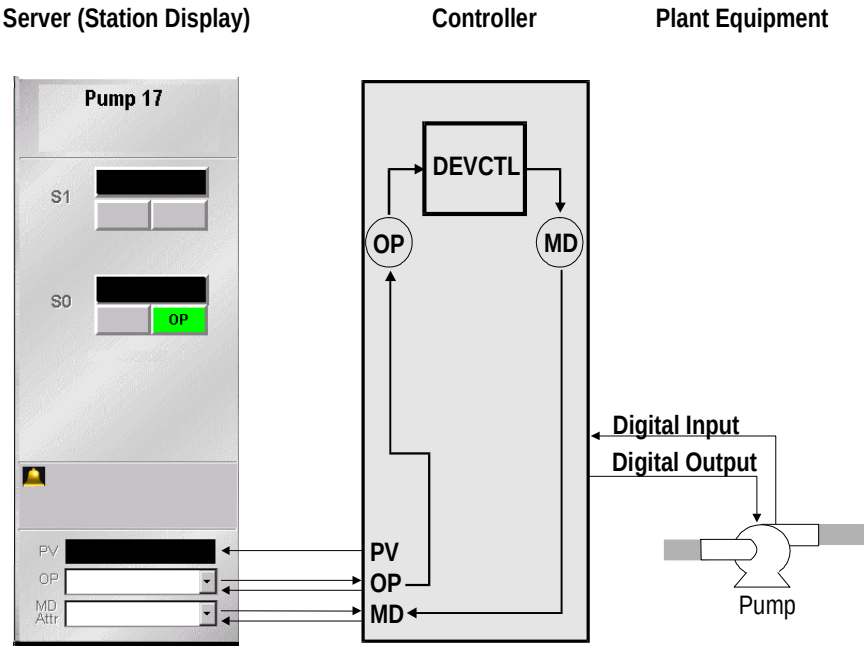


Figure 8.1 Status Point Representing a Pump

Status Point Process Variable (PV)

For every point in your system that is to be used in monitoring a process or value, you need to define the “input” (for example, the reading from a field device) so that the server knows what kind of information it has to read from the controller that is regulating that process or value.

This input is known in PlantScape as the “process variable” (or PV) of a point, because it represents values that are a function of the process itself (or the controller or both). Process variables cannot be changed by an operator.

Number of States

Status point PVs are used to represent the current "state" of the field device or process. For example, you could define four distinct states for a valve: TRAVEL, CLOSED, OPEN, and FAIL. The PV for a status point in PlantScape can be used to represent up to eight discrete states.

When you define the main properties for a status point, you need to specify the number of discrete input states you wish to represent with this point.

Status points represent these states by reading up to three consecutive discrete values from an address in the controller. If you need to monitor one or two states, you need a 1-bit address; for three to four states, it will be 2-bit; and for five to eight states it will be 3-bit.

Note

- Bits are numbered from the least significant to the most significant.
- For 2- and 3-bit addresses, the bits are assumed to be contiguous.

State Descriptors

For each state you wish to use, you need to define a short alphanumeric descriptor. The number of descriptors you enter must match your selected number of states.

For example, if you wanted to use a point to monitor and control a valve, the PV might be used to represent 4 states of that valve and the descriptors might be: TRAVEL, CLOSED, OPEN, and FAIL.

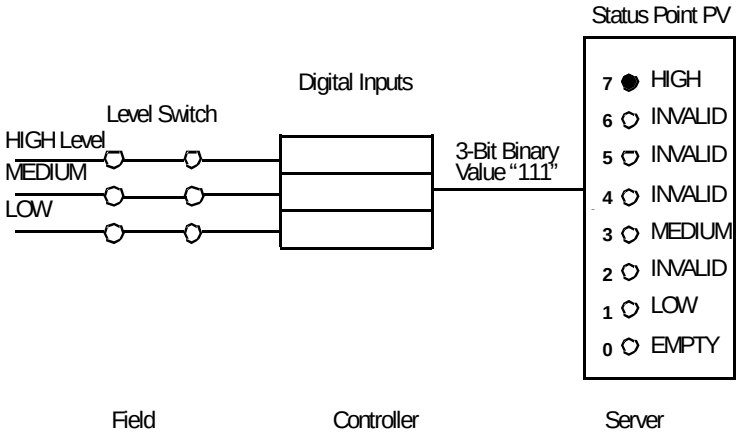


Figure 8.2 Status Point Configured for Eight States

Status Point Output (OP)

OP is the opposite of PV, that is, OP represents values that can be changed by an operator or by another component of the system when performing supervisory control. The OP of a point can only be changed by an operator if the mode of that point has been set to "manual." (For details of point modes, see "Status Point Mode (MD)" on page 125.)

For points in your system that are to be used in controlling a process or value, you need to define the available states that can be controlled.

For a status point, you can define up to four output states, which correspond to four of the input states for that point. In the valve example, you might define CLOSED, and OPEN as the two output states.

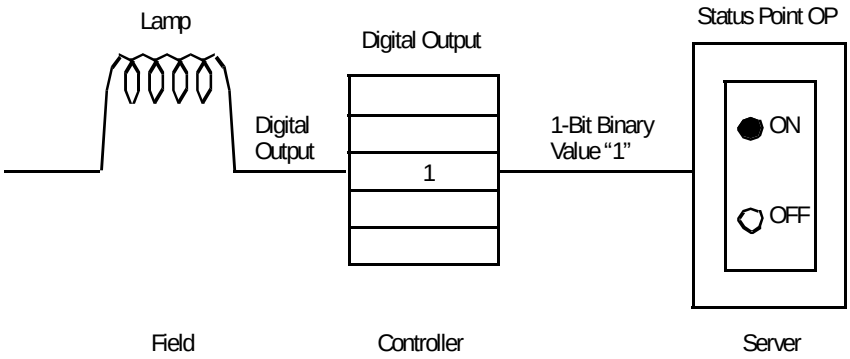


Figure 8.3 Status Point Output Value Example

Status Point Mode (MD)

The mode of a status point is used to determine whether or not an operator is permitted to control the output value. The two most common modes are: "manual" and "automatic".

MD can also be used with an alarm transportation algorithm to trigger an additional output under alarm conditions. See "Action Algorithms" on page 194.

For information about control modes, see "Control Modes" on page 153.

Analog Point Parameters

An analog point can represent the following different types of field values:

- Process Variable (PV)
- Output (OP)
- Mode (MD)
- Setpoint (SP)
- Up to four auxiliary values (A1, A2, A3, A4)

Analog points represent continuous values such as pressures or temperatures. Figure 8.4, “Analog Point Used to Represent a Temperature” on page 126 shows the relationship between a field value and an analog point.

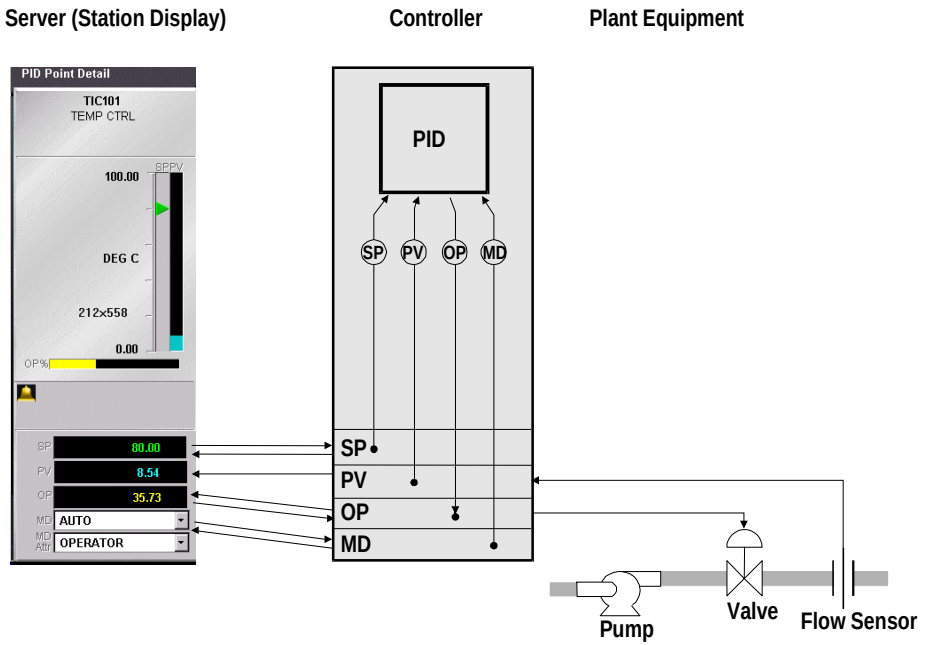


Figure 8.4 Analog Point Used to Represent a Temperature

Analog Point Process Variable (PV)

The PV of an analog point represents the current “reading” (represented in engineering units) of the field device or process. PVs are often used to represent the process variable of a control loop.

Engineering Units

In defining the PV of an analog point, you need to specify the engineering units used in representing the PV value; for example, degrees Kelvin, ohms, megalitres/minute, and so on.

Range High Value and Range Low Value

You also need to specify the highest and the lowest valid values of the range for this point. For example, if the maximum temperature reading for an oven is 600 degrees celsius, and the minimum is zero, you need to enter the value 600 as the **Range High Value** and 0 as the **Range Low Value** field so that the server can correctly "scale" or convert the raw data captured from the controller.

Drift Deadband

In defining the parameters of an analog point you can specify "drift deadbands" to eliminate unnecessary point processing and therefore reduce system load.

Whenever a value is scanned from a controller point, processing will only be performed if the value has changed by more than the configured drift deadband amount since processing last occurred. Only what you define as significant change will be processed. The deadband value is expressed as a percentage of the point range.

Point processing includes:

- Processing point alarms
- Processing point algorithms

Figure 8.5, "How Drift Deadbands Work" on page 128 shows how drift deadbands work in relation to PV.

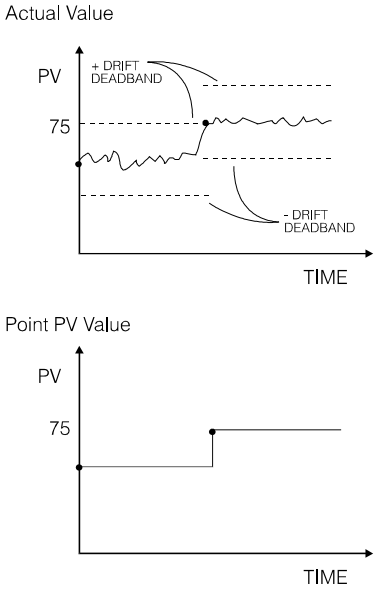


Figure 8.5 How Drift Deadbands Work

Clamp Point

When defining an analog point you can indicate whether you want the PV to be clamped to 0% if it less than the PV clamp low limit, and 100% if it is greater than the PV clamp high limit (for information about setting clamp limits, refer to"PV Clamp Values for Analog Points" on page 189).

For example, because of instrumentation inaccuracies or anomalies, a controller might give a reading of 9 units, when in fact you know that the reading should be zero. By setting a PV clamp limit of 10, you can force the reading from the controller to be read as zero. This can be useful for integrating a value over time.

The high and low limits for the PV clamp are defined on Station via the System Wide Point Configuration display (see "Server-Wide Point Configuration" on page 186 for more information).

Figure 8.6, "Effects of PV Clamping" on page 129 shows how PV clamps work.

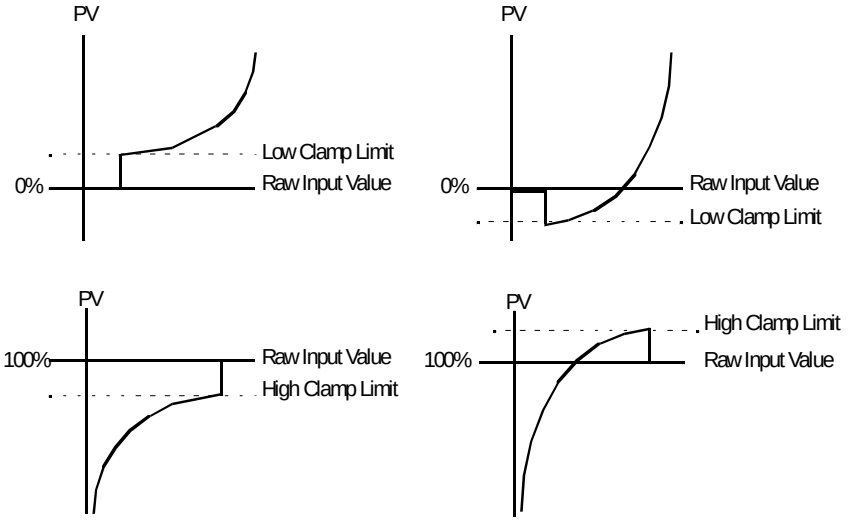


Figure 8.6 Effects of PV Clamping

Analog Output (OP)

The output (or "OP") can be used to read and write an analog value. It can only be changed by an operator if the mode is set to MANUAL (see "Analog Mode (MD)" on page 130). It is represented as a percentage value and is often used to represent the value ranges that an operator can control for a given point or the output of a control loop.

For example, in defining the OP of an analog point, you might define a temperature range of 0 to 550 degrees celsius that an operator can control for a furnace.

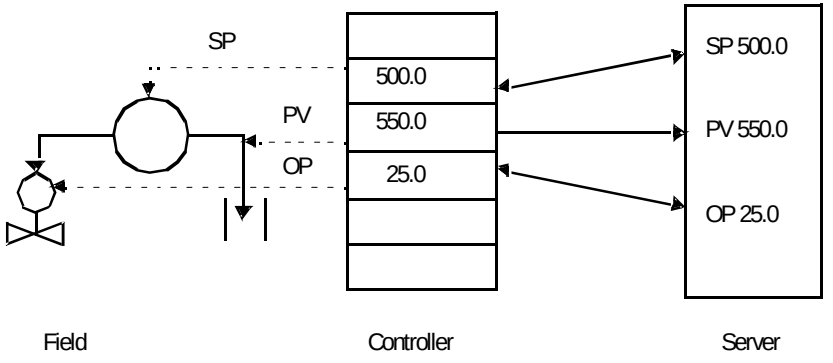


Figure 8.7 Analog Point

Analog Mode (MD)

The mode (or "MD") is used to determine whether or not an operator is permitted to control the output value. The two most common modes are: "manual" and "automatic." For more details about control modes, see "Control Modes" on page 153.

Analog Setpoint (SP)

The setpoint (or "SP") can be used to read and write an analog value in a controller. Set points are represented in engineering units and are often used to represent the ideal operating value for a process (for example, the temperature of a furnace) or the setpoint of a control loop.

Analog Auxiliary Values (A1, A2, A3, and A4)

Up to four additional values can be used to read and write four analog values in a controller. These auxiliary values are given names A1 to A4 and are represented in engineering units. Auxiliary values are often used to represent the tuning constants of a control loop.

Accumulator Point Parameters

Accumulator points represent totalizers. Figure 8.8, "Accumulator Point" on page 131 shows the relationship between a field value and an accumulator point.

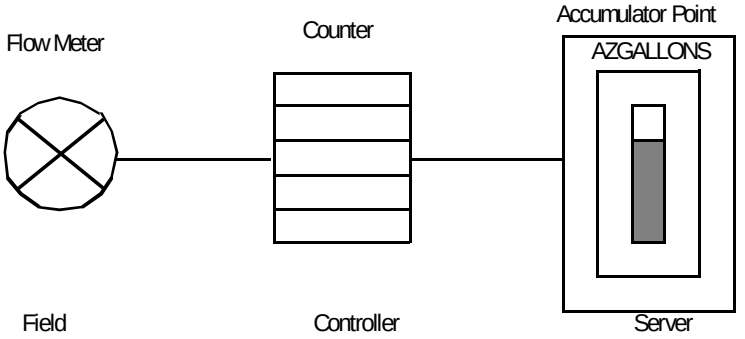


Figure 8.8 Accumulator Point

An accumulator point can access a single counter input value.

Accumulator Point Process Variable (PV)

The PV for an accumulator point is used to read a value from a counter that continues to increment until it reaches its rollover value, at which time it resets.

The following example describes how accumulator process variables work and illustrates some of the concepts used in defining the PV of an accumulator point.

Example

Suppose there is a server accumulator point named AZGALLONS and that this point is connected to a field value that is a counter that counts from 0 to 4096. At 4096, the counter's value rolls over to 0. Suppose also that the AZGALLONS scale and meter factors are set to 1 and that the values of AZGALLONS and the field values are as follows:

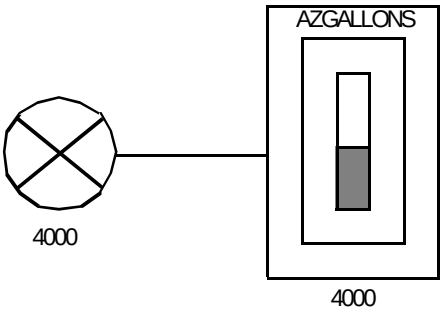


Figure 8.9 Initial Condition: Counter and Accumulated Value Both 4000

Now suppose that the value of the field counter changes to 4050. We then have:

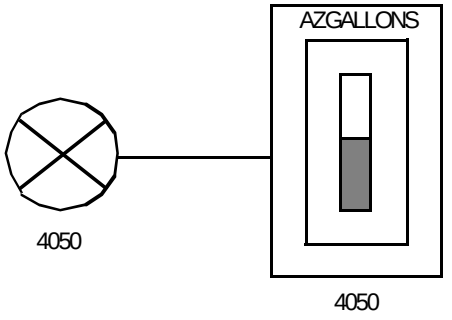


Figure 8.10 Counter Increases by 50

If the counter increases by another 50, it will roll over:

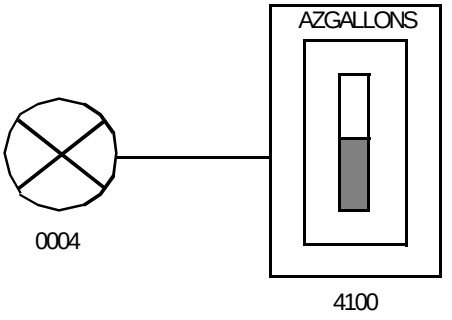


Figure 8.11 Counter Rolls Over

The value of AZGALLONS will continue to increase either until it is reset by an operator, or until it reaches the maximum value that it can display (in which case it will display a series of asterisks).

Engineering Units

In defining the PV of an accumulator point, you need to specify the engineering units used in representing the PV value for an accumulator point; for example, megalitres, Kwh, and so on.

Rollover Value

In defining an accumulator point you need to specify the value at which the "physical" counting or totalizing mechanism on the device or controller rolls over.

Note that, regardless of this "physical" rollover value, the accumulator point PV continues to increase indefinitely until it reaches its maximum value or until it is reset by an operator.

Range High Value

You also need to specify the value that represents the highest available range for this point. This is only used to scale the height of the PV indicator.

Scale Factor

The scale factor is a multiplier (usually close to 1) that is used to convert the raw counts of the totalizing device into engineering units. For example, if you are measuring totals in megalitres, and the counting device uses 1 count to indicate 1 megalitre, the scale factor would be 1; if it uses 1 count to indicate 2 megalitres, the scale factor would be 2.

Meter Factor

A meter factor is a multiplier that is used for calibration purposes.

Every time the controller's counter value is scanned, the PV value is determined by the following formula:

$$PVnew = PVold + (SF \times MF \times Rawcounts)$$

Part	***Description***
PVnew	The new PV
PVold	PV at the last scan
SF	The scale factor
MF	The meter factor
Rawcounts	The change in the counter value since the last scan. If the new raw count is less than the old raw count, the counter is assumed to have rolled over.

Summary of Point Parameters and Addresses

The names of the parameters reflect their most common usage. They can, however, be used to hold any controller values.

Because PlantScape can store and manage multiple values in the one point, you can use a single point to monitor and control a complete loop.

Not all parameters need to be configured for a point. In many cases, the only parameter of a point that needs to be configured is the PV which shows the current value of a given location within a controller.

The following table summarizes these parameters.

Parameter Types	*Status Points*	*Analog Points*	*Accumulator Points*
SP (Set Point)		✔	
PV (Process Variable)	✔	✔	✔
OP (Output)	✔	✔	
MD (Mode)	✔	✔	
A1 (Auxiliary #1)		✔	
A2 (Auxiliary #2)		✔	
A3 (Auxiliary #3)		✔	
A4 (Auxiliary #4)		✔	

Table 8.1 Summary of Point Parameter Types

Except for the PV parameter, the input/output point parameters listed in Table 8.1, “Summary of Point Parameter Types,” on page 134 can all be configured to have a source address, or a destination address, or both. The PV parameter can only be configured to have a source address, as it is used for the measured value of some element of the process, such as a temperature, that cannot be changed by the operator.

Summary of Internal Parameters

The following table shows the internal parameters for the point types status, analog and accumulator (acc.).

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
PointID	The name of the point. This name identifies the point.	36	✔	✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	***Description***	***ID***	***Status***	***Analog***	***Acc.***
Description	The description of the point.	37	✔	✔	✔
EULO	0% range	16	✔	✔	
EUHI	100% range	17	✔	✔	
AlarmLimit1	The value at which alarm 1 is tripped.	18		✔	✔
AlarmLimit2	The value at which alarm 2 is tripped.	19		✔	✔
AlarmLimit3	The value at which alarm 3 is tripped.	20		✔	✔
AlarmLimit4	The value at which alarm 4 is tripped.	21		✔	✔
AlarmLimit5	The value at which alarm 5 is tripped.	18		✔	✔
AlarmLimit6	The value at which alarm 6 is tripped.	19		✔	✔
AlarmLimit7	The value at which alarm 7 is tripped.	20		✔	✔
AlarmLimit8	The value at which alarm 8 is tripped.	21		✔	✔
AlarmType1	The type of alarm 1, for example, PVHI	22		✔	✔
AlarmType2	The type of alarm 2, for example, PVHI	23		✔	✔
AlarmType3	The type of alarm 3, for example, PVHI	24		✔	✔
AlarmType4	The type of alarm 4, for example, PVHI	25		✔	✔
AlarmType5	The type of alarm 5, for example, PVHI	22		✔	✔
AlarmType6	The type of alarm 6, for example, PVHI	23		✔	✔
AlarmType7	The type of alarm 7, for example, PVHI	24		✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
AlarmType8	The type of alarm 8, for example, PVHI	25		✔	✔
RollOver	Accumulator input rollover value, for example, a 12 bit counter rolls over at 4095.	26			✔
MeterFactor	The accumulator meter factor. Normally 1.0, is adjusted after meter proving.	27			✔
ScaleFactor	The accumulator scale factor, for example, 1 pulse.count = 5.678 liters.	28			✔
RawPV	The value of the accumulator raw input (the counter it is reading).	29			✔
SetpointLowLimit	Data entry of Setpoint values below this value will be rejected.	32		✔	
SetpointHighLimit	Data entry of Setpoint values above this value will be rejected.	33		✔	
OutputLowLimit	Data entry of Outpoint values below this value will be rejected.	34		✔	
OutputHighLimit	Data entry of Outpoint values above this value will be rejected.	34		✔	
LastProcessedDate	The day when the value of the PV last changed.	38	✔	✔	✔
LastProcessedTime	The time of day when the value of the PV last changed.	39	✔	✔	✔
H1M	History Standard 1 min	41	✔	✔	✔
H6M	History Standard 6 min	42	✔	✔	✔
H1H	History Standard 1 hour	43	✔	✔	✔
H8H	History Standard 8 hour	44	✔	✔	✔
H24H	History Standard 24 hour	45	✔	✔	✔
H5SF	History Fast 5 second. Configurable between 1 and 30 seconds.	46	✔	✔	✔
H1HE	History Extended 1 hour	47	✔	✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	***Description***	***ID***	***Status***	***Analog***	***Acc.***
H8HE	History Extended 8 hour	48	✔	✔	✔
H24HE	History Extended 24 hour	49	✔	✔	✔
OnScan	0=off,1=on	56	✔	✔	✔
Alarm Value	If the point is not in alarm, the Alarm Value parameter has a value of 0. Otherwise the value is equal to the alarm type as defined in the alarm limit. For example, if the point is in the PV LO state the Alarm Value parameter is 6.	57	✔	✔	✔
ControlLevel	The operator must have this control level or better to be able to control the point.	58	✔	✔	✔
AlarmDisabled	Alarming is disabled for the point. (0=enabled. 1=disabled)	59	✔	✔	✔
PVInError	The Process value is unreliable. (0=ok, 1=error)	60	✔	✔	✔
ModeInError	The Mode value is unreliable. (0=ok, 1=error)	61	✔	✔	✔
SetPointInError	The Setpoint value is unreliable. (0=ok, 1=error)	63	✔	✔	✔
OutputInError	The Output value is unreliable. (0=ok, 1=error)	62	✔	✔	✔
A1InError	The A1 value is unreliable. (0=ok, 1=error)	64	✔	✔	✔
A2InError	The A2e value is unreliable. (0=ok, 1=error)	65	✔	✔	✔
A3InError	The A3 value is unreliable. (0=ok, 1=error)	66	✔	✔	✔
A4InError	The A4 value is unreliable. (0=ok, 1=error)	67	✔	✔	✔
Units	The engineering units for the point, for example, Liters, The PV is 3.45 Liters.	68		✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
State0Descriptor	The text that describes PV state 0, for example, Travel.	68	✔		
State1Descriptor	The text that describes PV state 1, for example, Open.	69	✔		
State2Descriptor	The text that describes PV state 2, for example, Closed.	70	✔		
State3Descriptor	The text that describes PV state 3, for example, Invalid.	71	✔		
State4Descriptor	The text that describes PV state 4, for example, Stopped.	72	✔		
State5Descriptor	The text that describes PV state 5, for example, Stopped.	73	✔		
State6Descriptor	The text that describes PV state 6, for example, Stopped.	74	✔		
State7Descriptor	The text that describes PV state 7, for example, Stopped.	75	✔		
TargetPVforOPState0	The PV state that is expected for OP state 0, for example, 0=Travel.	76	✔		
TargetPVforOPState1	The PV state that is expected for OP state 1, for example, 1=Open.	77	✔		
TargetPVforOPState2	The PV state that is expected for OP state 2, for example, 2=Closed.	78	✔		
TargetPVforOPState3	The PV state that is expected for OP state 3, for example, 3=Invalid	79	✔		
PVAlgoNumber	The number of the algorithm used during PV processing.	85	✔	✔	✔
PVAlgoBlock	The number of the algorithm block used by the PV algorithm.	86	✔	✔	✔
ActionAlgoNumber	The number of the algorithm used during PV change processing.	87	✔	✔	✔
ActionAlgoBlock	The number of the algorithm block used by the PV change algorithm.	88	✔	✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	***Description***	***ID***	***Status***	***Analog***	***Acc.***
UnackAlarmExists	The point has alarmed and the alarm has not been acknowledged.	89	✔	✔	✔
Alarm1Priority	The alarm priority of alarm 1, for example, Urgent.	92		✔	✔
Alarm2Priority	The alarm priority of alarm 2, for example, Urgent.	93		✔	✔
Alarm3Priority	The alarm priority of alarm 3, for example, Urgent.	94		✔	✔
Alarm4Priority	The alarm priority of alarm 4, for example, Urgent.	95		✔	✔
Alarm5Priority	The alarm priority of alarm 5, for example, Urgent.	92		✔	✔
Alarm6Priority	The alarm priority of alarm 6, for example, Urgent.	93		✔	✔
Alarm7Priority	The alarm priority of alarm 7, for example, Urgent.	94		✔	✔
Alarm8Priority	The alarm priority of alarm 8, for example, Urgent.	95		✔	✔
State0AlarmPriority	The alarm priority of state 0, for example, Urgent.	92	✔		
State1AlarmPriority	The alarm priority of state 1, for example, Urgent.	93	✔		
State2AlarmPriority	The alarm priority of state 2, for example, Urgent.	94	✔		
State3AlarmPriority	The alarm priority of state 3, for example, Urgent.	95	✔		
State4AlarmPriority	The alarm priority of state 4, for example, Urgent.	96	✔		
State5AlarmPriority	The alarm priority of state 5, for example, Urgent.	97	✔		
State6AlarmPriority	The alarm priority of state 6, for example, Urgent.	98	✔		

Table 8.2 Internal Point Parameters

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
State7AlarmPriority	The alarm priority of state 7, for example, Urgent.	99	✔		
AlarmPriority	The alarm priority of unreasonable alarm.	100	✔		✔
AlarmSubPriority	The alarm subpriority of unreasonable alarm.	100	✔		✔
ControlFailAlarmPriority	The alarm priority at which a control failure is alarmed.	91	✔	✔	✔
ControlFailAlarmSubPriority	The alarm subpriority at which a control failure is alarmed	101	✔	✔	✔
Alarm1SubPriority	The alarm subpriority of alarm 1. (0-15)	102		✔	✔
Alarm1SubPriority	The alarm subpriority of alarm 1. (0-15)	103		✔	✔
Alarm2SubPriority	The alarm subpriority of alarm 2. (0-15)	104		✔	✔
Alarm3SubPriority	The alarm subpriority of alarm 3. (0-15)	105		✔	✔
Alarm4SubPriority	The alarm subpriority of alarm 4. (0-15)	106		✔	✔
State0AlarmSubPriority	The alarm subpriority of state 0. (0-15)	102	✔		
State1AlarmSubPriority	The alarm subpriority of state 1. (0-15)	103	✔		
State2AlarmSubPriority	The alarm subpriority of state 2. (0-15)	104	✔		
State3AlarmSubPriority	The alarm subpriority of state 3. (0-15)	105	✔		
State4AlarmSubPriority	The alarm subpriority of state 4. (0-15)	106	✔		
State5AlarmSubPriority	The alarm subpriority of state 5. (0-15)	107	✔		

Table 8.2 Internal Point Parameters

Internal Parameter	***Description***	***ID***	***Status***	***Analog***	***Acc.***
State6AlarmSubPriority	The alarm subpriority of state 6. (0-15)	108	✔		
State7AlarmSubPriority	The alarm subpriority of state 7. (0-15)	109	✔		
AssociatedDisplay	When the associated display key is pressed, this display is called up.	110	✔	✔	✔
AlarmMessageIndex	A point can be configured to generate a message. This is the message number.	114	✔	✔	✔
REALARM	If set (=1), the point in alarm transitions between alarm states.	116	✔		
PVExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the PV changes.	117	✔	✔	
MDExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the MD changes.	118	✔	✔	
OPExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the OP changes.	119	✔	✔	
SPExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the SP changes.	120		✔	
A1ExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the A1 changes.	117		y	
A2ExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the A2 changes.	118		✔	
A3ExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the A3 changes.	119		✔	
A4ExternalChangeAlarmEnable	If enabled (=1), an alarm is generated if the A4 changes.	120		✔	
State0AlarmEnabled	State 0 is an alarm state.	121	✔		
State1AlarmEnabled	State 1 is an alarm state.	121	✔		
State2AlarmEnabled	State 2 is an alarm state.	122	✔		
State3AlarmEnabled	State 3 is an alarm state.	123	✔		
State4AlarmEnabled	State 4 is an alarm state.	124	✔		

Table 8.2 Internal Point Parameters

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
State5AlarmEnabled	State 5 is an alarm state.	125	✔		
State6AlarmEnabled	State 6 is an alarm state.	126	✔		
State7AlarmEnabled	State 7 is an alarm state.	127	✔		
NumberOfInputStates	Number of Status PV states (2, 4, or 8)	129	✔		
NumberOfOutputState	Number of Status OP states (2 or 4)	130	✔		
NormalMode	The normal mode of the point, for example, Auto.	131	✔	✔	
PulseWidthSecs	For a status OP, if this is non zero, the OP will be reset to zero after this time.	132	✔		
OPReverse	The OP value is reversed.	133	✔	✔	
ControlConfirmRequired	If enabled (=1), the operator must confirm all changes to the point.	134	✔	✔	
ControlTimeout	An index to a system table that specifies the time in seconds that a control takes to complete.	135	✔	✔	
DriftDeadbandPercent	The value must change by more than this amount to be considered a change.	136		✔	
AlarmDeadbandPercent	The value must drop below the alarm limit by this amount before the alarm is returned.	137	✔	✔	✔
ControlDeadbandPercent	The value gets this close to the target value, the control is considered complete.	138		✔	
PVClampingEnabled	If enabled (=1), the PV will be clamped to the EULO and EUHI settings.	139		✔	
PointDetailDisplayDefault	The default detail display for the point type.	200	✔	✔	✔
GroupDetailDisplayDefault	The default group display for the point type.	201	✔	✔	✔

Table 8.2 Internal Point Parameters

Internal Parameter	***Description***	***ID***	***Status***	***Analog***	***Acc.***
PVAlgoExists	If set (=1), a PV algorithm has been built on the point.	301	✔	✔	✔
ActionAlgoExists	If set (=1), an Action algorith has been built on the point.	302	✔	✔	✔
PointInAlarm	The point is in alarm (0=no alarm, 1=in alarm)	303	✔	✔	✔
InRateOfChangeAlarm	If set (=1), a Rate of Change alarm exists.	304		✔	✔
InDeviationLowAlarm	If set (=1), a Deviation Low alarm exists.	305		✔	
InDeviationHighAlarm	If set (=1), a Deviation High alarm exists.	306		✔	
InTransmitterLowAlarm	If set (=1), a Transmitter Low alarm exists.	307		✔	
InTransmitterHighAlarm	If set (=1), a Transmitter High alarm exists.	308		✔	
InLowAlarm	If set (=1), a PV Low alarm exists.	309		✔	
InHighAlarm	If set (=1), a PV High alarm exists.	310		✔	
InLowLowAlarm	If set (=1), a PV Low Low alarm exists.	311		✔	
InHighHighAlarm	If set (=1), a PV High High alarm exists.	312		✔	✔
InUnreasonablyLowAlarm	If set (=1), an Unreasonably Low alarm exists.	313		✔	
InUnreasonablyHighAlarm	If set (=1), an Unreasonably High alarm exists.	314		✔	
ModeCheckDisabled	If set (=1), the mod is not checked before doing a control.	319	✔	✔	
A1AssociatedParameter	If non zero, the A1 value is store to this parameter.	320		✔	
A2AssociatedParameter	If non zero, the A2 value is store to this parameter.	321		✔	

Table 8.2 Internal Point Parameters

Internal Parameter	*Description*	*ID*	*Status*	*Analog*	*Acc.*
A3AssociatedParameter	If non zero, the A3 value is store to this parameter.	322		✔	
A4AssociatedParameter	If non zero, the A4 value is store to this parameter.	323		✔	
State0InAlarm	If set (=1), a State 0 alarm exists.	304	✔		
State1InAlarm	If set (=1), a State 1 alarm exists.	305	✔		
State2InAlarm	If set (=1), a State 2 alarm exists.	306	✔		
State3InAlarm	If set (=1), a State 3 alarm exists.	307	✔		
State4InAlarm	If set (=1), a State 4 alarm exists.	308	✔		
State5InAlarm	If set (=1), a State 5 alarm exists.	309	✔		
State6InAlarm	If set (=1), a State 6 alarm exists.	310	✔		
State7InAlarm	If set (=1), a State 7 alarm exists.	311	✔		

Table 8.2 Internal Point Parameters

Source and Destination Addresses

To define the main properties and control properties of a point, you need to understand source and destination addresses and how they are used. (See “Control Properties” on page 149 for information about defining control properties.)

Address Types

Points are generally used to read values from and write values to an address in a controller.

Locations (usually in the memory of the controller) that are to be read (or “scanned”) by the server are referred to as the *source address* for a point parameter.

Locations that are to be written to (or “controlled”) by the server are referred to as the *destination address* for a point parameter.

PlantScape uses "control confirmation" scans to ensure that controls are actually performed by a controller. If a point parameter has a source and a destination address, a parameter is scanned immediately after the value is changed. An alarm is generated if the scanned value does not match the controlled value.

Source and destination addresses generally refer to locations within real controllers. These addresses are known as *hardware addresses*.

The formats of hardware, source, and destination addresses depend on the type of controller. Details about the format of these addresses can be found in the Quick Builder online help for each controller.

It is also possible to address information in the server database, for example, the parameter of another point. These are known as *database addresses* (see page 179).

Point Scanning

Scanning is the process by which the server reads values from locations in controllers, specified by the source addresses, and stores them in point parameters.

The server uses the scanning process for status, analog, accumulator and access points.

To minimize the load on the whole system, it is important to plan for and implement an efficient scanning strategy. The two most common scanning methods are:

- Periodic
- Exception

Periodic Scanning

Periodic scanning is the regular scanning of a point parameter at specified time intervals.

You can choose from several scan periods, ranging from seconds to minutes, and you can assign a different scan period to each input/output point parameter when you configure each point. For example, if you assign a scan period of 15 seconds to the PV parameter of a point, the server scans the value in the controller every 15 seconds.

When choosing a scan period, consider the following factors:

- Whether the controller automatically reports changes of state. If so, periodic scanning might not be necessary (see "Exception Scanning" on page 146).

- The rate of change of the value. If a value only changes once an hour, it is inefficient to scan that value every five seconds.
- The rate at which history needs to be collected for the point (in the case of the PV parameter). A point requiring one minute snapshots to be recorded would have a scan period of no greater than 60 seconds. (For details of point history collection, see "History Collection and Archiving" on page 167.)
- How quickly field changes need to be available on a Station display. Dynamic values on a display are updated from the database at the configured update rate of the Station.
- The number of values that can be scanned from a controller at a particular scan rate. For example, it is unlikely that 2000 analog values could be scanned from a controller connected to server via a serial line operating at 1200 baud. Many factors influence this value; see "Scan Packets" on page 147 for more details.

Some experimentation might be required to arrive at optimum scanning periods. See "Analyzing the Scanning Load with lisscn" on page 148 for information on analyzing scanning performance.

Exception Scanning

Exception scanning is only available for those controllers that support the reporting of significant events to the server.

Significant events include:

- Changes in a status point
- Significant changes in an analog point
- Analog alarms

For more information about configuring this type of scanning, see the controller-specific online reference information, accessible via the Quick Builder online help.

Understanding Demand Scanning

Demand scanning provides a one-shot scan of a point parameter in response to a request. Two main types of demand scanning are used:

- Scan Point Special
- Control Confirmation

Scan Point Special

A Scan Point Special is a forced scan of point parameters. Whenever scanning of a point is disabled and then re-enabled (for example using the Point Detail display), a Scan Point Special is performed. Application programs and free format reports can request a Scan Point Special demand scan of a point. See "Configuring Reports" on page 239 and the *Application Development Guide* for more information.

Control Confirmation

After an OP, SP, MD, or a parameter control is issued, a demand scan is issued on the source address. This is to confirm that the control took place correctly. If the scanned value does not match the controlled value, a control fail alarm may be generated.

Refer to "Alarm Properties for Analog Points" on page 158 for more information on control fail alarms for analog points.

Refer to "Alarm Properties for Status Points" on page 156 for more information on control fail alarms for status points.

Scan Packets

The basic unit of scanning used by the server to acquire data from a controller is referred to as a *scan packet*. One scan packet represents a single input/output (I/O) or transaction with a controller; that is, every time the server sends a request to a controller for data, one scan packet is used.

A scan packet can access several addresses within a controller to provide values for several server points. Because the number of requests per second is generally a limiting factor, the scanning strategy should attempt to obtain the maximum number of point values in the minimum number of scan packets.

The basic requirements for points to be in the same scan packet are as follows:

- Points should be at the same scan period.
- Points should have source addresses that reference the same controller and are contiguous.
- The number of values to be acquired does not exceed the scan packet size for the particular controller.

Most controllers also require that the addresses to be scanned are contiguous.

Every time points are configured, the server re-builds the scan packets in order to re-optimize scanning. For example, the server will ensure that:

- If there are multiple references to an address at the same scan rate, there will be only one entry in the scan packet.
- If there are multiple references to an address at different scan rates, a single entry will be made at the fastest rate.

A separate scan packet is created for database addresses. Database addresses are used to scan information from other point parameters or from files in the server database. For details, see “Database Addresses” on page 179.

It is strongly recommended that you follow the instructions for optimizing scan packets (and hence maximizing scanning performance) as described in the online reference information for each controller interface.

Analyzing the Scanning Load with lisscn

The **lisscn** utility that comes with PlantScape can be used to list the details about the currently configured scan packets in the server database.

Use the **lisscn** utility program to list the currently configured:

- Scan packets in each scan interval (or period)
- Number of scan packets per interval
- Scan packets per interval per second

For details of how you run the **lisscn** utility, refer to “lisscn” on page 512.

Control Properties

Control properties enable authorized operators to intervene or to override the automatic control that is being carried out by controllers. For example, you might have a point that is to be used to monitor a pump so that operators can see whether the pump is on or off. In your system the controller connected to the pump will generally control the pump, but you might also want operators to be able to switch the pump on or off if necessary.

Control Properties for Status Points

Property	***See...***
Source Address and Destination Address	"Source and Destination Addresses" on page 144.
Scan Period	"Point Scanning" on page 145.
Output (OP)	"Status Point Output (OP)" on page 125.
Mode (MD)	"Control Modes" on page 153.
Reverse Output	"Reverse Output" on page 154.
Control Confirmation	"Control Confirmation" on page 152.
Number of Output States	"Number of Output States" on page 149.
Output State - Target Input State Associations	"Target Input State Associations" on page 150.
Pulse Width	"Pulse Width" on page 150.
Control Timeout	"Control Timeout for Status Points" on page 150.
Control Level	"Control Level" on page 154.
Normal Mode	"Normal Mode" on page 153.
Disable mode checking on output	"Control Confirmation" on page 152.

Number of Output States

The values specified for this property are the number of output states that can be controlled for this point, and up to four output states that correspond to input (PV) states for this point.

Target Input State Associations

Target input state associations are the PV input states that correspond to the output states you wish to use in controlling this point. See the Quick Builder online help for an explanation of descriptor values and their use.

Pulse Width

Pulsing is an action that can be performed by the server: if the server switches an output ON, a pulse width later the server can switch the output OFF.

The default is to disable pulsing.

Control Timeout for Status Points

Use this field to specify the maximum allowable time for the PV of the point to reach the target state for the OP action, before a PV FAIL alarm is generated.

For example, if a pump has just been serviced and an operator has used a Station display to set the pump to the ON state, the server then needs to read the controller to determine whether the pump is in fact ON or OFF. If the ON state is not achieved after the control timeout period, an alarm is raised to indicate that the control has failed.

To configure the generation of control timeout alarms for status point outputs or modes, as described in the previous examples, you must:

- Specify the target input states for the point.
- Enable the control failure alarm option (as described in “Alarm Properties for Status Points” on page 156).

Disable Mode Checking On Output

If mode control at a point is disabled, the mode of the point is ignored by the server (for example, even if the point mode is AUTO, the operator will still be able to perform point control).

Normally, the server checks the mode of the point before it allows an operator to change the OP for that point. In some circumstances (for example, you might not want to implement modes at that point), you might want to disable the routine mode-checks by the server.

Control Properties for Analog Points

Property	***See...***
Source Address and Destination Address	See "Source and Destination Addresses" on page 144.
Scan Period	See "Point Scanning" on page 145.
Setpoint (SP)	See "Analog Setpoint (SP)" on page 130.
Output (OP)	See "Analog Output (OP)" on page 129.
Mode (MD)	See "Control Modes" on page 153.
Reverse Output	See "Reverse Output" on page 154.
Control Confirmation	See "Control Confirmation" on page 152.
Low Control Limit and High Control Limit	See "Low and High Control Limit for OP and SP" on page 151.
Control Deadband	See "Control Deadband for Analog Points" on page 151.
Control Timeout	See "Control Timeout for Analog Points" on page 152.
Control Level	See "Control Level" on page 154.
Normal Mode	See "Normal Mode" on page 153.
Disable mode checking on output	See "Control Confirmation" on page 152.

Low and High Control Limit for OP and SP

Use the **Low Control Limit** and **High Control Limit** fields to specify the lowest and highest value that can be set for the OP or SP of this point.

These limits do not apply to the actual values that the controller is capable of registering or controlling, only to the control limits set for performing supervisory control with PlantScape.

Control Deadband for Analog Points

Use the **Control Deadband** field to specify a percentage value that is used in determining what constitutes a good control.

This works as follows. If the PV signal, read back after an SP control is issued, does not reach the following value within the period specified in the **Control Timeout** field (as described in the following section), a "PV FAIL" alarm is generated:

```
New SP Value ± Deadband Percentage
```

This check is performed every 10 seconds (from when the control is performed) until good control has been achieved or the control timeout period has elapsed (whichever happens first).

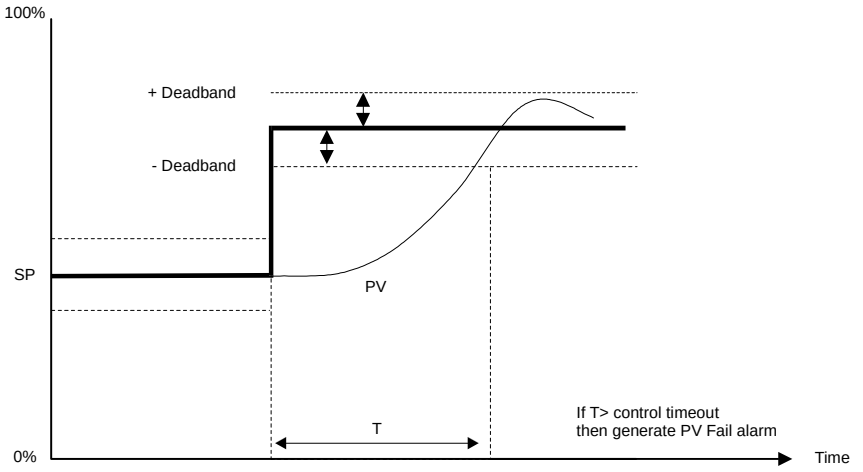


Figure 8.12 How Control Deadbands Work

Control Timeout for Analog Points

Use the **Control Timeout** field to specify the maximum allowable time for the PV of the point to reach the value within the control deadband of the new SP and within the specified timeout period, before a "PV fail" alarm is generated.

If a "control timeout" is configured and an analog point's SP or a status point's OP is controlled, the server scans the point's PV every ten seconds. The server keeps scanning every ten seconds until the values agree or until the control timeout value elapses.

For details of how you configure the generation of a control fail alarm, see "Alarm Properties for Analog Points" on page 158.

Control Confirmation

When an operator performs a control action on a point for which control confirmation has been specified, a prompt is displayed to the operator to "Please confirm control request." The operator must then enter a **y** in response before the control action is carried out or **n** to abort the command.

Control Modes

The current control mode of a point determines whether or not an operator is permitted to control the OP or SP of the point.

The available control modes are: manual, automatic, cascade, and computer.

Cascade and computer are only available with specific controllers. Most PlantScape device interfaces support just single bit modes (that is, values of **0** and **1**, displayed by default as **MAN** and **AUTO**).

For PLC devices this is used to scan/control a bit within the controller that is used for mode control within its logic. Other device interfaces define specific behavior for the mode values (for example, S9000 supports this feature).

Property	***Description***
Man	When the manual mode is set, an operator is permitted to change either the set point or the output value.
Auto	When the automatic mode is set, the controller itself (or sometimes the PlantScape Server) controls the output and operators cannot change the output value, unless "Disable mode checking on output" is set (see "Control Confirmation" on page 152).
Casc	Cascade mode is specific to S9000, TDC, and UDC controllers. The cascade mode is used when the SP is coming from the output of another PID loop within the controller (that is, PID loops are cascaded together). When the mode is set to cascade, operators cannot change either the set point or the output value.
Comp	This mode is specific to TDC controllers. The computer mode is used when the SP is coming from a computer that is performing automatic control. When the mode is set to computer, operators can change either the set point or the output values.

Normal Mode

When defining a point that includes a control you can specify what is to be the "normal mode" for that point. The normal mode applies:

- By default for this point.
- When an authorized operator presses the appropriate function key(s) to reset the mode after manual intervention. (For details, refer to the *Operators Guide.*)

For most points, the normal mode is **Auto**.

Control Level

The control level provides an additional form of security on individual points. For each point, you can specify a control level between 0 and 255. At Stations using operator-based security, operators can only control a point if they are defined with a control level equal to or higher than its control level. (See “Configuring Security and Access” on page 209 for information about operator-based security.)

Reverse Output

Reverse output is a control option that you can specify if you want the output of a status or analog point to be reversed. For example, a digital output may have been wired such that the field device is off when the actual controller output is on.

For analog output signals, this option is needed when the device to be controlled “closes” on a low (0%) signal and “opens” on a high (100%) signal.

Selecting this option reverses both the output and the input. For example, if a value of 20% was read from the field, the value would be displayed as 80%; if a value of 20% was entered by the operator, the output would be converted to 80%.

Note Some controller interfaces do not support reverse output.

Configuring Alarms for Points

Alarms are primarily used to notify operators of conditions that might call for intervention or supervisory control.

For information on how alarms work with respect to points on PlantScape Control Processors, refer to the Process Control Building Guide.

This topic describes how alarms for status, analog, and accumulator points work, and how to define alarms.

About Alarms and Events

PlantScape records each significant change in the values for a point as an event, which is written to the Events file and which operators can see on the Event Summary display. You use Quick Builder to configure when a change is to be considered as significant, and therefore which changes generate events (see "Alarm Properties for Status Points" on page 156, "Alarm Properties for Analog Points" on page 158, and "Alarm Properties for Accumulator Points" on page 161). You also use Quick Builder to configure selected point events to be treated as alarms (see "Defining Events, Alarms, and Alarm Priorities" on page 162).

Every time a point value changes, the server checks to see whether an alarm should also be generated for the new value. If the server determines that an alarm condition exists, it sends an alarm message to the appropriate Stations or printers, depending on how the Station has been configured (as described in "Configuring Alarms" on page 68).

For each point in your system you can define a range of properties that are used to determine the types of conditions or events that should generate alarms and how those alarms should be prioritized.

You can define alarm properties for status, analog, and accumulator points, but the types of alarms and how they are used vary according to the point type.

To define conditions that generate an event or an alarm for a point:

1. Select the point in the Quick Builder item list.
2. Click the Alarms tab and complete the fields on the Alarms tab.

Alarm Properties for Status Points

Property	*See...*
Enable (State Alarms)	"State Alarms for Status Points" on page 156.
Priority and Sub Priority	"Defining Events, Alarms, and Alarm Priorities" on page 162.
External Change Alarms	"External Change Alarms for Status Points" on page 157.
Control Fail Alarm	"Control Fail Alarms for Status Points" on page 157.
Alarm Message Index	"Specifying an Alarm Message Index" on page 165.
Ack Destination Address	"Specifying Addresses for Alarm Acknowledgments" on page 157.
Disable Alarming	"Disabling Alarming" on page 165.
Re-alarm between Alarm States	"Alarms on Transition for Status Points" on page 157.

You can define the following types of alarms for a status point:

- State alarms
- Alarms on transition
- Control failure alarms
- External change alarms

State Alarms for Status Points

Any of the PV states of a status point can be defined to be an alarm state. For example, you might define an alarm for the FAILED state of a valve so that the operator can be alerted as soon as there is a problem.

As well as defining which state(s) should generate an alarm, you can also define the priority of each alarm.

To associate a PV state with an alarm:

1. Select the **Enable** checkbox for each PV state that is to be used in generating an alarm.
2. For each state that is to generate an alarm, select an alarm priority from the **Priority** selection list, and specify an alarm sub-priority in the **Sub-Priority** field.

   Alarm priorities and sub-priorities are described in "Defining Events, Alarms, and Alarm Priorities" on page 162.

Alarms on Transition for Status Points

You can also configure alarms to be generated if the PV of a point changes from one alarm state to another. For example, if you define both CLOSED and FAILED as alarm states for a valve, the server generates an alarm when the valve fails, and generates an additional alarm when the valve closes as a result of the failure.

Control Fail Alarms for Status Points

When a status point control is issued, the server tests for control failure as follows:

- After an OP, MD, or a parameter control is issued, a demand scan on the source address is performed by the server. If the scanned value does not match the controlled value, a control fail alarm is generated.
- If a control timeout value has been defined on the Control property sheet, a PV Fail Alarm will be generated when the PV fails to match the OP. (See the description of "Control Timeout for Status Points" on page 150.)

External Change Alarms for Status Points

An external change is a change in the value of a parameter that is not caused directly by an operator control issued through the server. An alarm is issued when the value referenced by the parameter is changed in the field device.

For status points, you can enable alarms for external changes in PV, OP and MD.

Note The external change alarm setting applies only to the parameter being directly controlled. For example:

- Point1 and Point2 are built with their OPs viewing the same field location and with external change alarms enabled on their OPs. An operator control to the OP of Point1 is an external change to the OP of Point2, so Point2 issues an external change alarm.
- Point3 is built with its PV and OP viewing the same field location and with external change alarms enabled for the PV. An operator control to the OP is an external change to the PV, so the point issues an external change alarm.

Specifying Addresses for Alarm Acknowledgments

For status points, you can use Quick Builder to specify an address (for example, in a controller) to which the alarm acknowledgment can be written.

The address is shown on the Alarms tab of the Status Point Detail display, in the Controller Destination Address field.

You might use this feature, for example, if the controller on which this point is built cannot continue normal functioning until the alarm state is acknowledged. For further details, see the Quick Builder online help.

Alarm Properties for Analog Points

Property	*See...*
Alarm Type	"PV Limit Alarms for Analog Points" on page 158.
Priority and Sub Priority	"Defining Events, Alarms, and Alarm Priorities" on page 162.
Limit	"PV Limit Alarms for Analog Points" on page 158.
External Change Alarms	"External Change Alarms for Analog Points" on page 161.
Unreasonable Value	"Unreasonable Low and Unreasonable High Alarms for Analog Points" on page 160.
Control Fail Alarm	"Control Fail Alarms for Analog Points" on page 161.
Alarm Message Index	"Specifying an Alarm Message Index" on page 165.
Disable Alarming	"Disabling Alarming" on page 165.
Alarm Deadband	"Alarm Deadband for Analog Points" on page 161.

Four types of alarms can be configured for analog points:

- PV Limit
- Unreasonable High and Unreasonable Low
- Control failure
- External change

PV Limit Alarms for Analog Points

You can configure up to eight alarms for each analog point to indicate when the PV goes beyond certain limits. You can also define the same types of alarms for accumulator points.

Alarm Types and Limits

PV High

A PV High alarm is generated when the PV rises above the specified limit.

PV High High

A PV High High alarm is generated when the PV exceeds the specified limit, which must be greater than the PV High limit.

PV Low

A PV Low alarm is generated when the PV falls below the specified limit.

PV Low Low

A PV Low Low alarm is generated when the PV falls below the specified limit, which must be less than the PV Low limit.

Deviation High and Deviation Low

A Deviation Low alarm is generated when the PV drops below the SP by the value:

- For a positive range, for example, 0 to 100, this will be a negative number.
- For a negative range, for example, -100 to 0 (rarely used), this will be a positive number.

A Deviation High alarm is generated when the PV goes above the SP by the value:

- For a positive range, for example, 0 to 100, this will be a positive number.
- For a negative range, for example, -100 to 0 (rarely used), this will be a negative number.

Example A point has an SP of 80, and you want to generate:

- A deviation low alarm when the PV drops below 75
- A deviation high alarm when the PV rises above 90

You would set the limits as follows:

Deviation Low Alarm Limit = - 6

Deviation High Alarm Limit = 11

Note To suppress deviation alarms for the time a control loop needs to follow a new setpoint, set the point's control timeout to the required delay time. After this time has elapsed a deviation alarm will be generated if the deviation is still outside the specified deviation limits.

Rate Of Change

A Rate Of Change alarm is generated when the rate of change of the PV exceeds the specified rate of change limit. The limit is specified in engineering units per second.

Transmitter Low

A Transmitter Low alarm is similar to the PV Low alarm. It can be used to indicate a failed transmitter signal.

Transmitter High

A Transmitter High alarm is similar to the PV High alarm. It can be used to indicate a failed transmitter signal.

For each alarm, you can also specify the alarm priority, sub-priority and the specific limit. Alarm priorities and sub-priorities are described in "Defining Events, Alarms, and Alarm Priorities" on page 162. Alarm limits are described below.

Alarm Limit

You use the **Limit** field for each alarm type to specify the value (in engineering units) at which the alarm should be generated.

Unreasonable Low and Unreasonable High Alarms for Analog Points

In addition to the previous alarm types, you can also configure a set of alarms for an unreasonable high value and an unreasonable low value for the PV of an analog point.

To define these alarms, you need to use Station as well as Quick Builder:

- You use Station to define the unreasonable high and unreasonable low limit values.
- You use Quick Builder to define the alarm priority and sub-priority for unreasonable values for each point.

Using Station

The "unreasonable high" and "unreasonable low" values are server-wide settings that you specify on the Point Processing tab of the Alarm & Point Processing display on a Station. See "Server-Wide Point Configuration" on page 186 for details.

Using Quick Builder

Use the Alarm property sheet to enable unreasonable value alarms as follows:

1. Select an alarm priority (other than `None`) from the **Priority** list for the **Unreasonable Value** field.
2. Specify a sub-priority for the alarm in the **Sub Priority** field.

Alarm priorities and sub-priorities are described in "Defining Events, Alarms, and Alarm Priorities" on page 162.

Alarm Deadband for Analog Points

On the Alarm property sheet for an analog point you can specify an alarm deadband so that an analog value (moving in and out of the alarm limit) will not generate unwanted alarms.

To define a deadband, select a percentage value from the **Alarm Deadband** list.

Control Fail Alarms for Analog Points

When an analog point control is issued, the server tests for control failure as follows:

- After an OP, SP, MD, or auxiliary parameter control is issued, a demand scan on the source address is performed by the server. If the scanned value does not match the controlled value, a control fail alarm is generated.
- If a control timeout and control deadband value have been defined on the Control property sheet, a PV Fail Alarm will be generated when the PV fails to match the SP. (See the description of "Control Deadband for Analog Points" on page 151 and "Control Timeout for Analog Points" on page 152.)

You select an alarm priority and sub-priority for the control fail alarm on the Alarms tab.

External Change Alarms for Analog Points

For analog points, you can configure alarms for external changes in PV, OP, MD, and SP. For a detailed description of external changes and when alarms are triggered, see "External Change Alarms for Status Points" on page 157.

Alarm Properties for Accumulator Points

Property	***See...***
Alarm Type	"Accumulator Point Alarm Types" on page 162.
Priority and Sub Priority	"Defining Events, Alarms, and Alarm Priorities" on page 162.
Limit	"Accumulator Point Alarm Types" on page 162.
Disable Alarming	"Disabling Alarming" on page 165.

Accumulator Point Alarm Types

For each accumulator point you can define up to four alarms for indicating when the PV has gone beyond certain limits.

You can choose from three alarm types for an accumulator point when defining an alarm to indicate when the PV has gone beyond certain limits:

Property	*Description*
Rate Of Change	The rate of change of the PV, in engineering units per second, exceeds the limit.
PV High	The PV rises above the limit.
PV High High	The PV rises above the limit which must be greater than the PV High limit.

For each alarm, you can also specify the alarm priority, sub-priority, and the specific limit. Alarm priorities and sub-priorities are described in "Defining Events, Alarms, and Alarm Priorities" on page 162. Alarm limits are described below.

Alarm Limit

You use the **Limit** field for each alarm type to specify the value (in engineering units) at which the alarm should be generated.

Defining Events, Alarms, and Alarm Priorities

You use the Alarms tab in Quick Builder to specify which changes in a point's values are recorded as events, and which point events generate alarms.

Note The priority of alarm for system events, such as communications failures, and operator-events, Station, and printer alarms are configured using Station.

The priority determines whether the server treats a change as an event or an alarm:

Property	***Description***
Journal	The change is written to the event file, where it can be accessed for alarm and event reports, or event displays on a Station. Journal priority alarms do not appear in the Alarm Summary.
Low, High or Urgent	The change is displayed in the alarm line at the bottom of a Station display to bring new alarms to the attention of operators and/or directed to an alarm/event printer. It also appears in the Alarm Summary.

Alarm Sub-Priorities

Within each alarm priority level, you can classify alarms as having sub-priorities between 0 and 15, where 0 represents the lowest sub-priority and 15 the highest.

Alarm priorities (and their sub-priorities) are used in determining which alarms will take precedence in the alarm line of a Station display (see below).

Elevating the Alarm Priority

You can specify a change in alarm priority for a alarms that are unacknowledged for a configured amount of time.

To elevate the alarm priority:

1. On the System Configuration Menu display, click Alarm & Point Processing. The Alarm & Point Processing display opens.
2. Click the Alarm Priorities tab.
3. Select the Alarm Priority Elevation enabled checkbox.
4. In the Low to High field specify the time period after which unacknowledged low priority alarms are elevated to high priority.
5. In the High to Urgent field specify the time period after which unacknowledged high priority alarms are elevated to urgent priority.

Configuring the Precedence of Alarms in the Alarm Line

The sub-priority defined for each alarm determines which alarm takes precedence appears in the alarm line of a Station display. The alarms that appear in the alarm line are sorted as follows:

1. Unacknowledged
2. Highest priority
3. Highest sub-priority
4. Newest/oldest
   The default setting is "newest", but you can set your preference on the System Wide Configuration display
5. The order in which they appear on the alarm summary

For example, with alarm precedence set to "newest," an alarm line would show the following alarms in the following order:

10:18 unacknowledged, urgent, sub-priority 13
10:19 unacknowledged, urgent, sub-priority 13
10:20 unacknowledged, urgent, sub-priority 11
10:30 unacknowledged, low, sub-priority 15
10:30 unacknowledged, low, sub-priority 12
10:31 acknowledged, urgent, sub-priority 15

Filtering Alarms in the Alarm Summary

The Alarm Summary on a Station is used for viewing all the current and unacknowledged alarms for a Station.

To call up the Alarm Summary, do one of the following:

- Click the **Alarm** button on the tool bar
- Press <**F3**>
- Click **Alarms** on the System Main Menu display
- Select **View** ⇒ **Alarms** on the System menu bar

For each alarm, the display contains a line of information showing details of the alarm, such as the time, point ID, alarm type, priority, whether or not it has been acknowledged, and so on. (For a more detailed description of this display, refer to the *Operators Guide*.)

The alarms are displayed in chronological order and users can choose between viewing:

- Only urgent alarms (by choosing **Urgent only** from the Priority list at the top of the display)
- Only high alarms and urgent alarms (by choosing **High and Urgent** from the Priority list at the top of the display)
- All alarms (by choosing **All** from the Priority list at the top of the display)

When the Alarm Summary is called up, it defaults to showing the alarms in all areas that the Station is assigned to. If you want only the alarms in a particular area to be displayed, select an area from the **Area** list at the top of the Alarm Summary display.

When the Alarm Summary is called up, it defaults to showing acknowledged and unacknowledged alarms. If you want only unacknowledged alarms to be displayed, select the **Unacknowledged only** checkbox.

Specifying an Alarm Message Index

For status, analog, and accumulator points you can specify an **Alarm Message Index** number that corresponds to a pre-defined alarm message.

To define up to two lines of message text for an alarm, open Points – Server-Wide Items and select the Define Alarm Messages link.

If you specify an alarm message number for a point's alarms, the message text defined for the specified alarm index will appear in the Message Summary display.

Note For information about using alarm text in a distributed server architecture, see "Alarm Message Index" on page 344.

Disabling Alarming

The Point Detail–General tab contains an **Alarms enabled** check box, which you can use to inhibit alarms temporarily or permanently for a point.

You might need to temporarily disable alarming in the following circumstances:

- When you are building your system
- When equipment needs to be repaired or replaced

If you need to temporarily disable alarming when a status point changes to a nominated state, you can use the Status Change Alarm Group Inhibit algorithm (#79) or the Status Change Alarm Area Inhibit algorithm (#80). The configuration of algorithms is described in "Configuring Algorithms" on page 193.

You can also disable all alarms across the system (see "Point Alarm Enabling/Disabling" on page 187).

Configuring External Alarm Notification Points

You can configure points to alarms, such as sirens, that can be observed even when users are not logged into Station. See "Server-Wide Point Configuration" on page 186 for more information.

History Collection and Archiving

PlantScape can be configured to store the values of points at predetermined intervals to create a history of process values. This process is known as history collection and archiving.

This historical information can then be called up on a Station Trend display so that operators can monitor the trends in the processes represented by those points.

Note You might also want to use the event archiving option for event collection, storage, and retrieval. For information about the event archiving system, refer to "Configuring Extended Event Archiving" on page 383.

You can use Station to configure history collection for points. For points on PlantScape Control Processors, this is the only way you can configure history collection. For details, see "Viewing History Collection Configuration" on page 169.

You use Quick Builder to define history collection for status, analog, or accumulator points on other types of controllers.

Types of History Collection

When you configure a point to store historical values, the server scans the point parameters at pre-determined intervals according to the following choices for history collection:

- Standard
- Extended
- Fast

To define the type of history to be collected for a point, select one or more history collection type check boxes for the parameters defined for a point. The choices are described below.

Standard History

When you configure Standard History collection for a point, the following snapshots and averages are stored:

- 1-minute snapshots
- 6-minute averages of the 1-minute snapshots

- 1-hour averages of the 1-minute snapshots
- 8-hour averages of the 1-minute snapshots
- 24-hour averages of the 1-minute snapshots

The averages are calculated using the 1-minute base interval. That is, for 6-minute averages are calculated on six 1-minute values. If you change the 1-minute base interval the averages are still calculated from the base interval. For example, if you change the base interval to 30 seconds, 6-minute averages are calculated on twelve 30-second values.

Extended History

When you configure Extended History collection for a point, the following process history snapshots are stored:

- 1-hour snapshots
- 8-hour snapshots
- 24-hour snapshots

Fast History

You use Fast History to take snapshots of data of selected point parameters every 1 to 30 seconds, depending on the rate you selected during installation.

To configure one or more points for Fast History collection:

1. Use Quick Builder to select Fast History for the appropriate parameters for each point.
2. Follow the instructions in "Configuring Trend Set Displays" on page 230 for configuring a Trend Set display for a point that has been configured for the collection of Fast History.

The retention period and the number of samples for each history interval are shown in the table below.

History Types	***Intervals***	***Default Retention Period***	
		Duration	***Number of Samples***
Standard History	1-minute snapshot	24 hours	1442
	6-minute average	7 days	1682
	1-hour average	7 days	170
	8-hour average	3 months	281
	24-hour average	1 year	368

Table 8.3 Default Retention Periods

History Types	*Intervals*	*Default Retention Period*	
		Duration	*Number of Samples*
Extended History	1-hour snapshot	7 days	170
	8-hour snapshot	3 months	281
	24-hour snapshot	1 year	368
Fast History	1 - 30-second snapshot	1 hour	3670 - 122

Table 8.3 Default Retention Periods (Continued)

Gating Points, Parameters, and States

To avoid collecting inaccurate historical data (for example, a zero error on a flow transmitter when the associated valve is closed or the pump off), you can define the conditions under which data should be collected. You do this as follows:

1. Select a gating point from the drop-down list of points.
2. Select a parameter from the drop-down list of parameters.
3. Specify the state for that gating point in the **State** field.

For example, for a point monitoring a flow, you would probably only want to collect history when the pump is running. In this case you would define:

- The gating point as the point ID of the point that monitors the pump
- The state of the gating point as ON (or whichever wording you have configured for that state of the PV)

Note A history sample is still collected regardless of the gating state. When the gate point is not in the gate state, the history samples for the point are saved as a "bad value" and therefore will not affect history averages that are calculated from the snapshots.

Viewing History Collection Configuration

You can view the points configured for history collection by selecting **Configure** ⇒ **History** ⇒ **History Assignment** to call up the History Collection displays.

You can also use these displays to add points and parameters for history collection.

Note Because you do not use Quick Builder to configure CDA points (points on PlantScape Control Processors), you use the History Collection displays to configure history collection for these points by entering the point IDs and parameters of the points whose history you want to collect.

Configuring History Archiving

The number of samples that can be stored, and the number of points that can be assigned to have history collected for them, depend on database sizing.

When the number of samples stored equals the maximum number that can be stored, the oldest history sample is discarded in order to store a new sample. (For details about database sizing, refer to the installation guide.)

If you need to keep point history data for future use, you can archive the online history files. When you archive online history files, the history files for the nominated history intervals are saved to a default folder on the hard disk of the server.

Specifying Folders for History Archives

The default folder for saving history archives is specified during the installation process. This folder is also the default starting point for history archive searches.

You can specify additional history archive folders for use in archive searches. The additional folders are automatically included in history archive searches, or you can specify one as the starting point of a search.

To change the default history archive folder or to specify additional history archive search folders:

1 Open the PlantScape Server Control Panel.

2 Select History Archive from the **RegistryKey** list.

3 In the **String** field, enter the starting folders for your history archive folder trees. The first folder path in the string is the default archive folder. Enter any additional folders after the default folder, separating them with semi-colons. The changes take effect next time you start the server.

Note Because archive searches scan all subfolders under a specified history archive folder, you should not specify the root folder of the server hard disk as a history archive folder. If you do, the search will scan the entire hard disk before it returns any information.

Each history archive is created in a new subfolder under the default history archive folder, or the folder specified in its configuration. The files in an archive folder should not be changed.

The name of each history archive subfolder indicates when and how the archive was made.

If the archive was created using the History Archiving Configuration display, the name format is:

a*yYYYYmMMdDDhHHtTT*

Where	***Is...***
YYYY	The year that the archive was made.
MM	The month that the archive was made (for example, 01 for January, 02 for February, and so on).
DD	The day that the archive was made (for example, 03 for the 3rd day of the month, and so on).
HH	The hour that the archive was made (for example, 13 for 1 pm).
TT	The history type.

If the archive was created by running a report, the name format is:

a*yYYYYmMMdDDhHHrRRR*

Where	***Is...***
YYYY	The year that the archive was made.
MM	The month that the archive was made (for example, 01 for January, 02 for February, and so on).

Where	*Is...*
DD	The day that the archive was made (for example, 03 for the 3rd day of the month, and so on).
HH	The hour that the archive was made (for example, 13 for 1 pm).
RRR	The number of the history archive report that was used to create the archive.

Determining Space Requirements for a History Archive

To calculate the space required for a history archive, add up the space requirements for each history interval to be included in the archive.

To calculate the disk space required for a history interval, you need to know:

- The maximum number of point parameters (P) that can be collected for that interval.
- The maximum number of samples (N) that can collected for the interval. The maximum number of point parameters and samples is determined by the server database size. For details, see Table 8.3, "Default Retention Periods," on page 168.

Use the following formula to calculate disk space in bytes:

```
Space (bytes) = (P + 2)* (N + 2) * 4
```

Example If 1-minute history can store samples for eight hours for 1000 point parameters, the size of the history file would be:

```
(1000 + 2) * (480 + 2) * 4 = 1,931,856 bytes (1.8Mb)
```

Creating History Archives

History archives are created using the History Archiving display. History Archives created using the History Archive report are supported for backward compatibility.

The History Archiving display allows you to:

- Enable history archiving for each history type
- Check the time of the last archive
- Force an archive to be run

Consideration

The History Archiving display does not display last archive times for history archives run via a history report.

To configure history archives:

1. From the System Configuration Menu display, click **History Archiving.**
2. Using the checkboxes under **History Types to Archive**, select the history types you want to archive. (See "Types of History Collection" on page 167 for a detailed description of history types.)
3. Enter the minimum free disk space that must be available for this archiving job to run. This prevents all of the free disk space on the server from being used for history archive files. (If the disk becomes full, system performance will be severely degraded.)

Deciding When to Archive History

Note Applicable to the History Archive report only.

The number of samples and the interval specified for history collection determine how often archiving needs to be performed if all history samples are to be saved for a particular history interval. To find out the default retention periods for history intervals see Table 8.3, "Default Retention Periods," on page 168.

For example, if the database can store 24 hours of one-minute history, the one-minute history interval will need to be archived once per day.

To configure a history archive report:

1. From the System Configuration Menu display, click **Reports**. The Reports display is called up.
2. On the Reports display, click any blank line. The Report Definition tab is called up.
3. From the **Report type** drop-down list, select History Archive.
4. Specify other details as required. You must select at least one of **Enable reporting on request** or **Enable periodic reporting** checkboxes if you want the archive configuration to be run.
5. Click the **Content** tab.
6. Using the checkboxes under **History Types to Archive**, select one or more history types and intervals. (See "Types of History Collection" on page 167 for a detailed description of history types.)
7. Under **Archive Location**, you can specify any folder as the root of a path to this archive. To use the default History Archive folder, leave this field blank.

   Note It is possible to specify an Archive Location folder that is not included in the History Archive path. If you want PlantScape to access this archive, you must add the folder to the History Archive path (for details, see "Configuring History Archiving" on page 170).

8 Under **Disk Limit**, enter the minimum free disk space that must be available for this archiving job to run. This prevents all of the free disk space on the server from being used for history archive files. (If the disk becomes full, system performance will be severely degraded.)

The Disk Free limit is a system wide limit used by all history archive reports. (For more information on disk space see "Determining Space Requirements for a History Archive" on page 172.)

Separate History Archive Reports are usually configured for each history interval.

Removing History Archives

You can move history archives from the default history archive folder. You may want to do this if you disk becomes full.

Considerations:

- Moving history archives has implications for trend sets. If a trend set requires data from an archive that has been moved, you need to restore the archive. (The archive should be restored to a folder other than the default history archive folder. Use the PlantScape Server Control Panel to specify additional folders to read archives from.)
- If you specify a network path to access archives that have been moved, this can affect system performance.
- If you delete history archives, you cannot include samples from the archive in trend sets.

To remove history archives:

1 On the History Archiving display, select the required archive management option for each history type. The options you can select are Retain, Move, or Delete.

2 If you select Move or Delete, specify the number of days until the archive is moved or deleted. If you specify 0 the archives are not moved or deleted.

Configuring Station Displays for Points

As part of points configuration you can:

- Associate a display with each point
- Group related points to form:
  - Operating groups
  - Trend sets

For any point in your system, you can also specify:

- A user-defined Point Detail display, instead of the standard Point Detail display
- A user-defined Group Faceplate Template display, instead of the standard Group Faceplate Template display

Associated Displays

If you define an associated display for a point, operators can select a point (say, on any standard Station display or in an alarm message) and press the Associated Page key (<F2>) to call up a custom display that has been defined as the associated display for that point.

Pressing <F2> without selecting a point calls up the Associated Display for the point in the Station Alarm Line.

You usually do this when you have built custom displays to be called up quickly by an operator. For example, you might want operators who are viewing an alarm message to be able to directly call up the custom display for that point to help them identify the point and its function in the system.

For information on defining the associated display for a point on a PlantScape Control Processor, see the Process Control Building Guide.

You can configure an associated display for a point by either:

- Using Quick Builder to specify the associated display, or
- Using the Point Detail display on Station to specify the associated display page number. For information on calling up Point Detail displays, see “Changing Point Configuration via Station Displays” on page 178.

Operating Groups and Trend Sets

By configuring operating groups, you enable users to view the current operating data (or configuration data) for up to eight points (status, analog, or accumulator) on a single Station display (an Operating Group display).

By assigning points to a trend set, you enable users to view trend information for the data collected from those points by calling up a Trend Set display. For examples of Operating Group and Trend Set displays, refer to "Configuring Group and Trend Displays" on page 225.

You can configure up to 16000 operating groups and up to 3000 trend sets. Before assigning points to operating groups and trend sets, you need to have thought about the number of groups and trends you will need in your system, and which points are to belong to which groups and trends.

You can use Quick Builder to configure points to form operating groups or trend sets. You can also use Station displays, as described in "Configuring Group and Trend Displays" on page 225.

For information about defining operating groups and trend sets for points on a PlantScape Control Processor, see the Process Control Building Guide.

Note When you use Quick Builder to configure operating groups and trend sets, you can only assign a point to one operating group and one trend set. When you use Station to configure operating groups and trend sets, you can assign a point to as many operating groups or trend sets as you want.

If you assign a point to more than one operating group or trend set on Station, and then "backbuild" your configuration data by uploading it from the server to Quick Builder, this information about the multiple groups and trend sets will be lost because Quick Builder can only handle a single operating group and a single trend set per point.

User-Defined Point Detail Displays

PlantScape comes with a set of pre-defined displays that are used to show point detail data.

You can create custom Point Detail displays and then use Quick Builder to specify the custom Point Detail display for particular points.

For information on creating a user-defined point detail display for a point on a PlantScape Control Processor, see the Process Control Building Guide.

Group Faceplate Templates

PlantScape comes with a set of pre-defined "faceplates" or templates that are used for status, analog, or accumulator points in a Group Detail display.

For example, the following figure shows a Group Detail display for an operating group consisting of two analog points and six status points. The analog points in this display all use the standard faceplate for analog points and the status points all use the standard faceplate for status points.

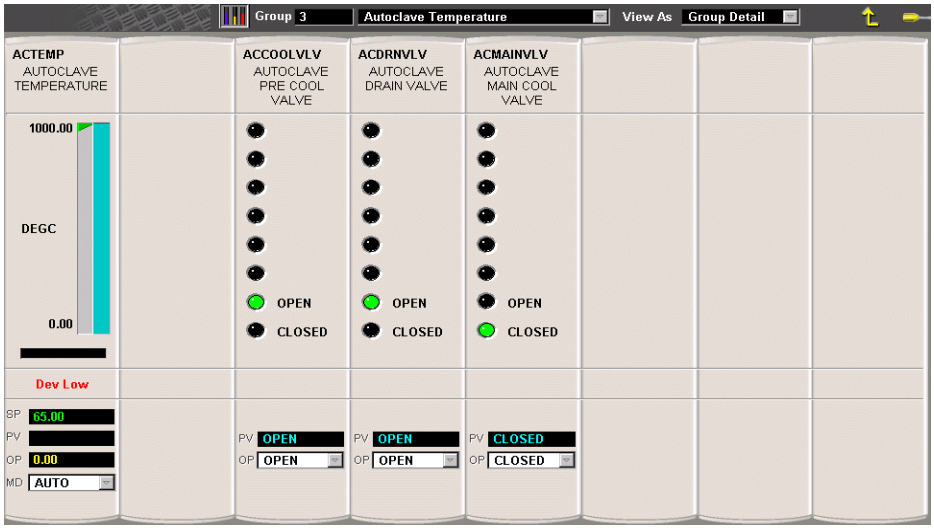


Figure 8.13 Operating Group Detail Display

You can create custom Group Faceplate Template displays and then use Quick Builder to specify the template for particular points.

For information on defining a custom Group Faceplate Template display for a point on a PlantScape Control Processor, see the Process Control Building Guide.

You use Quick Builder to specify a user-defined Group Faceplate Template display for a status, analog, or accumulator point.

Using Quick Builder to Configure Displays for Points

You use Quick Builder to specify which operating groups and trend sets that a point is to belong to, and which Associated display, Point Detail display, and Group Faceplate Template are to be used.

Changing Point Configuration via Station Displays

After a point definition has been stored in the server database, you can use the Point Detail display on Station to view configuration details for the point.

You can also use a Point Detail display to change point configuration information, but you must be using Station at a security level of SUPV or higher.

Most point configuration information can be changed in Point Detail displays. The following information cannot be changed via these displays:

- Source and destination addresses
- Scan periods
- Additional algorithms
- Status point ranges
- State descriptors
- Point ID

Note When you use a Point Detail display to change the point configuration data in the server database, the configuration data in the Quick Builder project file will no longer match the server database.

It is good practice to keep the Quick Builder data synchronized with the server data by using the Quick Builder upload function to upload point data from the server database to the Quick Builder project file database.

Calling Up a Point Detail Display

To call up a Point Detail display in Station, in the command zone on any Station display, type the point ID, then select the Detail button on the tool bar, or press <F12>.

There is a different Point Detail display for each point type.

Advanced Point Configuration

The configuration tasks described in this topic relate to functions that are not essential to implement for the successful running of your system, but rather allow you to take advantage of some advanced features of PlantScape point configuration.

The following procedures show how to:

- Define points to represent an address in the database, rather than an address in a controller
- Use auxiliary parameters
- Build points off-scan
- Perform server-wide point configuration tasks
- Use point internal reference numbers
- Checking the scanning performance of your system

Database Addresses

You can configure points to access addresses in the database, rather than addresses in controllers. Such points are sometimes known as “database points”, but they have the characteristics of the type of fixed point they are accessing.

The database addresses can be either point parameters or user files. For details about user files, see the *Application Development Guide*.

To configure a “database point”, you specify that the address type for its PV Source Address is “Point”.

The syntax for accessing a database address for a point parameter is:

```
P: Point_id param
```

Where:

Point_id and *param* are the point ID and parameter of the point to be referenced.

Example

To scan the SP parameter of the point with a point ID of FLOW1, into the PV parameter of another point, the following source address would be used:

```
P: FLOW1 SP
```

When a source address is configured for a database type address, an equivalent destination address is automatically defined. Destination addresses cannot be explicitly configured for database addresses.

Note You could configure a point on a PlantScape Control Processor as a source address for a database point. However, this is inefficient and might significantly degrade system performance.

Internal Point Parameters

Apart from the standard point parameters (described in "Scanned Point Parameters" on page 122) PlantScape uses a range of other parameters to store internal information for the point. Examples of these types of parameters are alarm limits and ranges for an analog point.

Whenever an item of information in a point needs to be referenced in another part of the server (for example, when building custom displays), you identify that item by specifying the point ID and the parameter name. For details of the internal point parameters available, see Table 8.2, "Internal Point Parameters," on page 134.

Using Auxiliary Parameters

For an analog point you can define up to four auxiliary parameters for general purpose use. For example, you might want to define auxiliary parameters to represent the proportional, integral, and derivative parameters of a PID loop controller. Auxiliary parameters can also be used for tracking and modifying alarm limits that are held in a controller.

For each auxiliary parameter, you can configure:

Property	***See...***
Source Address	"Source and Destination Addresses" on page 144.
Destination Address	"Source and Destination Addresses" on page 144.
Scan Period	"Point Scanning" on page 145.

Using Auxiliary Parameters to Track Controller Alarm Limits

If you set the auxiliary parameter name to match the name of an internal point parameter, then the internal parameter's value will track the value in the controller. If the internal parameter is changed, the value will also be written to the auxiliary parameter's destination address.

This is especially useful for keeping alarm limits in a controller synchronized with point alarm limits. For example, if a name of AlarmLimit1 was given to an auxiliary parameter, then the first alarm limit for the point would follow the auxiliary parameter's value.

Building Points Off-Scan

If you are adding points, and you do not want point processing (such as algorithm or alarm processing) while you are implementing your system, you can build your points "off-scan" by ensuring that the **Scanning Enabled** check box is not checked as you define them with Quick Builder.

After completing your points configuration, you can call up the Point Detail display for each point on Station (as described in "Changing Point Configuration via Station Displays" on page 178), and use the **Scanning and control enabled** check box under **Services** to enable scanning and control for that point.

Creating User-defined Data Formats

Data formats convert field values into values that are more useful for operators and other applications.

You can create user-defined data formats for the following types of controllers:

- Allen-Bradley
- OPC Client
- Modicon
- Moore APACS
- Siemens S5 and S7
- Hitachi
- GE Fanuc Series 90

You can create:

- *Unscaled formats*, which converts (but does not scale) a field value before loading it into the parameter.

  With an unscaled format, you need to define the scaling for each parameter that uses the format.

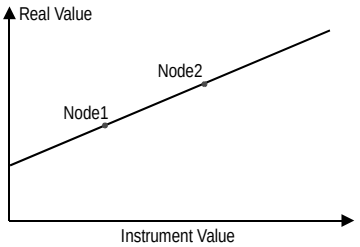
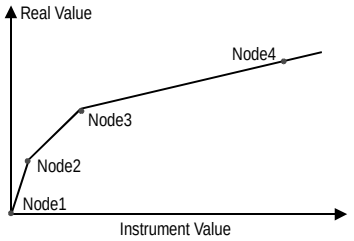
- *Scaled formats*, which converts and scales a field value before loading it into the parameter.

  With a scaled format, parameters that use this format are automatically scaled.

To create a user-defined data format:

1 On the **System Configuration Menu** display click **User-defined Data Formats**.
2 Click the Unscaled or Scaled tab, as appropriate.
3 Click an empty data format row.
4 Enter the name for the data format. (Do not use any name listed in "Reserved Data Format Names" on page 186.)
5 Enter the details as appropriate.

Property	***Description***
Name	The unique name of the data format. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes). Do not use any name listed in "Reserved Data Format Names" on page 186.
Data type	The data format of the field value, which can be: • `INT2` (16-bit integer). If you select this, you can specify the **Start bit** and **Width** of the field value. (By default these are 0 and 16 respectively). • `INT4` (32-bit integer) • `REAL4` (single-precision IEEE floating point)
Signed Value	If selected, indicates that the field value ranges from negative to positive values.
Minimum, Maximum	Specifies the minimum and maximum field values. Enter `NaN` if you do not want to specify a value.
Swap bytes, Swap words	Specifies whether the bytes/words of the field value are swapped during conversion. Field values are assumed to be big-endian (high order byte first). For example, if a device uses big-endian storage and the field value is INT4 in two 16-bit registers with the least significant 16-bits first, you would select **Swap words**. If the device used little-endian storage, you would also select **Swap bytes**.

Property	***Description***
Type	The type of conversion, which can be either: • **Linear**. A conversion ratio defined by **Node 1** and **Node 2**. Note that the nodes only define the conversion ratio, not the minimum/maximum values.  • **Piecewise Linear**. Approximates a conversion curve that can have up to seven nodes. 
Node 1 to Node 7	Each node specifies a **Field value** and its corresponding **Converted value**. For a scaled data format, the converted values must be between `0.0` and `1.0`.

Example **Example 1**

A device stores values in a 16-bit register in big-endian format. Additionally, the value stored ranges from 10 to 60, but you want that value represented in PlantScape as 0 to 1000 regardless of what the point's range is.

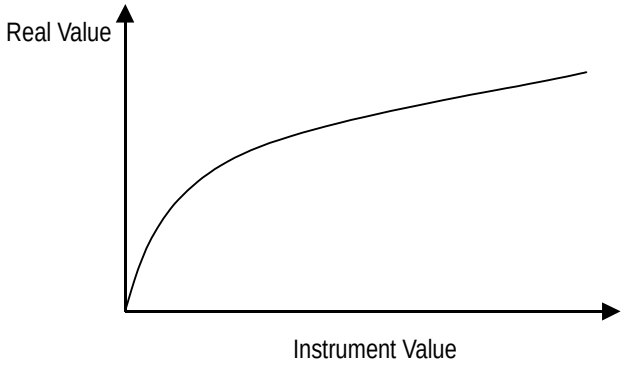
To define a format for this:

1. Define an unscaled data format.
2. In the **Field Value** section select `INT2` from **Data type**, and set the **Start bit** to `0` and **Width** to `16`.
3. Select **Signed value**. (Do not select **Swap words** or **Swap bytes**.)
4. Enter **`NaN`** in **Minimum** and **Maximum**.
5. In the **Conversion** section select **Linear**. Set the node values as follows.

Node	*Field value*	*Converted value*
1	`10`	`0`
2	`60`	`1000`

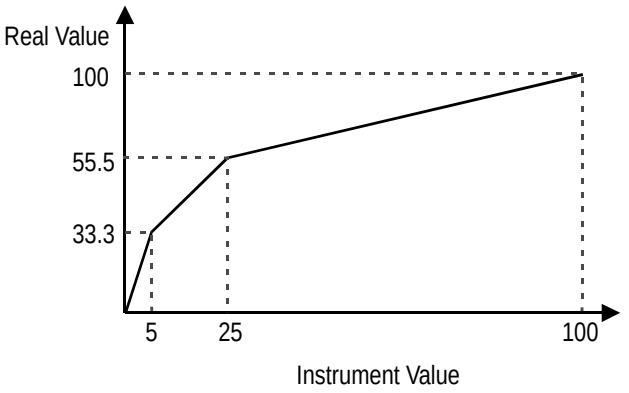
Example 2

A device stores values in two 16-bit registers in little-endian format. The value stored is an IEEE floating point number. However, the response curve of the instrument that generates the value is shown in the following figure.



To define a data format for this:

1. Determine the nodes you need to define to obtain the desired accuracy. In this example, you decide to define four nodes, as shown in the following figure. (The first node is at 0,0.)



2 Define an unscaled data format.
3 In the **Field Value** section select REAL4 from **Data type**.
4 Select **Swap bytes**. (Do not select **Swap words**.)
5 Enter **NaN** in **Minimum** and **Maximum**.
6 In the **Conversion** section select **Piecewise linear curve**.
7 Set the **Node** values as follows.

Node	***Field value***	***Converted value***
1	0	0
2	5	33.3
3	25	55.5
4	100	100
5 to 7	NaN	NaN

Reserved Data Format Names

B0	DPS6I4	HIGHWORD	LOWWORD	S8B	U32BS
B12	E3BCD	IEEEFP	LREAL	S9999	U32BSB
B12E	FENUM	IEEEFPBB	MFCFP	SCALED	U3BCD
B12ES	FS90DC	IEEEFPL	MFCTM	SLC_AI	U4095
B12S	FS90DS	IEEEFPLB	MMU	SLC_AO	U4BCD
B15	FS90PVA	LCN0	MMUS	SREAL	U6BCD
B4	FS90RDR	LCN1	MODE	T1	U8B
B7	FS90SEC	LCN10	PIUOP	T2	U8BCD
C16	FSC0TO10V	LCN2	PMXFP	TD	U999
C3BCD	FSC0TO20MA	LCN3	R32	U100	U9998
C4BCD	FSC0TO5V	LCN4	REVWD	U1023	U9999
C8BCD	FSC1TO5V	LCN5	S16B	U14B	UBCD12
D9999	FSC2TO10V	LCN6	S32B	U15B	UBCD16
DPR3V	FSC4TO20MA	LCN7	S32BB	U16B	VAXFP
DPS6DP	FTEXT	LCN8	S32BS	U32B	XLPCC
DPS6FP	HALFWD	LCN9	S32BSB	U32BB	XLPRH
DPS6I2					

Server-Wide Point Configuration

Some configuration items apply server-wide, that is, to all points. These items are configured using the Alarm and Point Processing display.

To configure these server-wide items you need to be using Station at a security level of SUPV, or higher.

The following server-wide items can be configured:

- Alarming
- Message text
- External Alarm Notification
- Logging of alarms returned to normal
- Unreasonable high limit and low limit PVs
- PV clamp values

Point Alarm Enabling/Disabling

When you are configuring a point, you can disable its alarms in Quick Builder. (see “Configuring Alarms for Points” on page 155).

Server-Wide Alarms

You can temporarily disable all alarms for your system by deselecting the **Alarms enabled server-wide** checkbox on the Alarm Processing tab under Alarm & Point Processing.

By default, **Alarms enabled server-wide** is selected.

Area Alarms

If you have areas enabled on your system, you can temporarily disable all alarms for points in a specific area. On the Area Configuration display, deselect the Enable Alarms checkbox for the required area.

Alarms for Individual Points

To disable or re-enable alarms for an individual point after your system is up and running, go to the Point Detail — General display for the point. In the **Services** group, select or deselect **Alarms Enabled**.

Configuring Return-to-Normal Alarms

For points with multi-stage alarms, you can inhibit log entries until all stages return to normal. For example, a point might have two alarm stages, pre-alarm and alarm. If the point goes into pre-alarm and then returns to normal, the log entry for the pre-alarm parameter is generated immediately. If the point goes into pre-alarm and then into alarm, the pre-alarm parameter returns to normal, but the log entry for pre-alarm return-to-normal is only generated when the alarm parameter also returns to normal.

To inhibit return-to-normal alarms, select **Alarm return-to-normal only on non-alarm states**.

External Alarm Notification

You can use the Alarm & Point Processing — Alarm Processing tab to specify up to four points to receive alarm notifications and control an external device, such as a siren, that will attract attention even if no one is logged into a Station.

Notifications are issued according to the priority of the alarm. You can specify an external alarm notification Point ID and Parameter for Low, High, Urgent, and Any priority alarms.

When external alarm notification is enabled, the specified point parameter is controlled to:

1, when an alarm occurs

0, when an alarm is acknowledged or returns to normal

You cannot specify active times or re-alarm times for external alarm notifications, as you can for Stations audible alarms.

To enable or disable external alarm notification for any of the four priority choices, select or clear the appropriate checkbox.

Configuring Unanswered Alarms

You can configure PlantScape to raise an alarm if an existing alarm is not acknowledged within a specified time. This type of alarm is called an unanswered alarm.

To configure unanswered alarms:

1 On the System Configuration Menu display, click **Alarm and Point Processing**.

1 On the Alarm and Point Processing display click the Alarm Processing tab

2 Click the Unanswered alarms enable checkbox.

3 Specify the area in which the unanswered alarm is to be raised.

4 In the Alarm Acknowledgement period field, specify the time in minutes that an alarm can remain unacknowledged before an unanswered alarm is raised.

Customizing Alarm Colors

PlantScape has predefined colors for alarms in the alarm summary, the status line indicators, off-scan points. If these colors are not suitable for your site, you can customize these colors.

To customize alarm colors:

1 On the System Configuration Menu display, click **Alarm and Point Processing**.

2 On the Alarm & Point Processing display click the Alarm Colors tab.

3 Under Alarm Colors select the appropriate color for each alarm priority you want to change.

4 Select **Use these colors for points on displays** if you want the custom alarm colors to appear on your displays.

To customize status line indicator colors:

1. On the System Configuration Menu display, click **Alarm and Point Processing**.
2. On the Alarm & Point Processing display click the Alarm Colors tab.
3. Under Status Line Indicator Colors select the appropriate color for each indicator you want to change.

To customize the color of points off-scan:

1. On the System Configuration Menu display, click **Alarm and Point Processing**.
2. On the Alarm & Point Processing display click the Alarm Colors tab.
3. Under Point State Colors select the appropriate color.

Point Processing Limits

If you want alarms to be generated when the PVs of analog points reach an unreasonably high or unreasonably low value, you need to:

1. Use the **High limit** and the **Low limit** fields (**Unreasonable value**) on the Point Processing tab of the Alarm & Point Processing display to specify the high and the low limit values, expressed as a percentage of the point range.
2. Enable unreasonable value alarms by specifying an alarm priority for **Unreasonable Value** in the Quick Builder Alarm property sheet (as described in "Alarm Properties for Status Points" on page 156).

PV Clamp Values for Analog Points

If you want to implement PV clamp values, you can use the **PV Clamp** field for **High Limit** and **Low Limit** on the Point Processing tab of the Alarm & Point Processing display to specify the high and low clamping limits.

The values are entered as a percentage of the point range. The value of the point will be clamped between the high and low limit (see "Clamp Point" on page 128).

Understanding Internal Point Numbers

The maximum number of status, analog, accumulator and other points you can create is determined by the size of your database. (For details of database sizing and the default allocation of the maximum number of points within types, refer to the *Installation Guide*.)

When you download point data from Quick Builder to the server database, each point is assigned a unique *point number* in the range from 1 to 65000. These numbers are used to uniquely identify points within the server. They are internal numbers that are not displayed in Quick Builder.

When a point is deleted from the server, the internal number for that point is freed, and is available to be allocated to another point.

If you need to know which internal point numbers are currently in use, you can use the **listag** utility to list the points currently configured in the database. For details of running the **listag** utility, refer to "Command Reference" on page 483.

Note All references to points in the server database use the internal point number. If you reload a point, the point will retain its internal point number. However, if you delete a point and then add the point some time later, it might be allocated a different internal point number. This means that the point is no longer available to custom displays currently being displayed, or to standard displays such as Trend Sets, that accessed it. You need to:

- Re-enter the point on standard displays (such as Trend Sets).
- Re-load into Station any custom displays that reference the point (from the Station menu, select **View ⇒ Reload Page**).

Checking the Scanning Performance of Your System

You can use the Scanning Statistics display on a Station to view statistics for the scanning subsystem and to check on the scanning performance (of controllers other than the Control Processors).

To call up the Scanning Statistics display:

1 On the System Configuration Menu display click **Channels**. This calls up the Channel Configuration Summary display.

2 On the Channel Configuration Summary display click the **Channel Scanning Statistics** link.

This calls up the Scanning Statistics display, which consists of the following three sections providing information on channel scan loads, scan units, scan period loading, and System Sinewave parameters:

- Channels
- Scanning Scheduling
- System Sinewave

Channels

This section contains channel-based statistics that enable the scan load on individual channels to be analyzed.

Property	*Description*
Channel	Shows the channel number and name.
Status	Shows the channel service status (for example, **OK** for "in service", **DISABLED** for "out of service").
Ovld	Indicates an overload if the channel is unable to process all its requests or the channel cannot do the work it was requested to do in the time specified.
Daq and Cnt	These columns list the number of data acquisition requests outstanding and control requests outstanding for each channel. These two figures should usually be on or near zero. If either of these figures increase to a number over 100 and do not decrease, the channel cannot process all of its scan load. This will lead to a scan overload that will be indicated in the **Ovld** column. At the top of the acquisition and control columns are figures that refer to the number of queue entries available to the server in order to perform each action. These figures should always be greater than zero. Lower down in the list of channels, there might be non-zero numbers associated with unimplemented channels. You can ignore the figures for unimplemented channels.
Deferred, Immediate, & Configuration	These fields are used by Honeywell for diagnostic purposes.

Scanning Scheduling

Property	*Description*
Scan units	Shows the number of milliseconds specified for the basic scanning unit. This figure is usually 500 m.s. (i.e. 0.5 second) and should only be altered by Honeywell.
Period	Lists the scan periods configured on your system. Periods are shown in number of scan units.
Clock	If the value displayed in the **Clock** column is 0 or greater, this indicates that the period is idle. When the clock is negative, that period is carrying out scanning. Taking the 60 period as an example, if there were only 2 requests on the period, then one would be processed at -1, and the other at -31, at which time the 'clock' would go to 29. The more scan packets per period, the closer the clock will get to counting between 0 and -period.

Property	*Description*
Cycles Behind	Indicates that the length of time since the last scan is greater than the scan period. Cycles behind is only valid while the current cycle is behind. When the next cycle starts, this entry will be reset to zero.
Requests Lost	This column displays the number of requests lost. A lost request is when an entry cannot be queued into the data acquisition or control queue because of an overload condition.
	Note: The server should be **0** cycles behind and should not have discarded (lost) any requests.
Scan Table Pointers	These three columns analyze the contents of the table that holds all scan entries. This table is built during point building and can be viewed using the `lisscn` utility. Within the table, scan periods have been entered consecutively and within each scan period there is an entry for each scan packet for that period. This information is used by Honeywell. **first** The table record which is the first for that period. **number** The number of records belonging to that period. The number of scan packets per period. **current** The record within that period that was last processed.

System Sinewave

The System Sinewave is a useful indicator of the system scanning load. If the Sinewave is not smooth, or has missing or repeated values, this indicates the system may be overloaded.

If you are signed on to Station at the MNGR security level, you can set the low and high values and the period.

A point can reference the current System Sinewave value if its source address is F:8 R:1 W:114 b:0 W:15.

Configuring Algorithms

Algorithms perform additional point processing or initiate actions when point values change.

Note

- You cannot configure algorithms for flexible points and container points (see "Template Displays and Container Points" on page 237).
- For information about constraints on configuring algorithms for a distributed server architecture, see "Working with Algorithms" on page 348.
- You cannot configure algorithms for points on PlantScape Control Processors. However, you can reference Control Processor points in algorithms that are attached to other point types.

PlantScape provides a number of standard algorithms, each performing a different function. These algorithms are available for alarm processing, data analysis, value transportation, action requests, downtime analysis, and application task requests.

Each type of algorithm has a different number. This number is specified when the algorithm is configured for a point. For example, the value transportation algorithm is algorithm number 68.

Two classes of algorithm are available:

- PV algorithms (see page 193)
- Action algorithms (see page 194)

PV Algorithms

PV algorithms perform data gathering or data manipulation. The result of the algorithm operation is usually stored in the PV of the point to which it is attached. PV algorithms are processed whenever the PV changes by more than the configured drift deadband amount for the point.

For example, say you needed to determine the number of hours that a pump has been running and to store this value in a point's PV. You could attach the "run hours" algorithm to the status point, which determines whether or not the pump is running, and this would give a "run hours" reading.

The following PV algorithms are available.

- General Arithmetic (Algo#4)
- Production (Algo#5)

- Run Hours (Algo#7)
- General Logic (Algo#10)
- Composite Alarm Processing (Algo#12)
- Integration (Algo#15)
- Cyclic Task Request (Algo#16)
- Piecewise Linearization (Algo#22)
- Maximum/Minimum (Algo#64)

Action Algorithms

Action algorithms initiate some action when the PV of the point to which they are attached changes. Action algorithms are processed whenever the PV of a point changes.

For example, say you needed to run a report when a status point changes to a certain state. You could attach the Status Change Report Request algorithm to the status point, and the report would be requested when the status point changed to a nominated state.

The following action algorithms are available:

- Composite Alarm Initiation (Algo#11)
- Down Time Analysis (Algo#65)
- Value Transportation (Algo#68)
- Status Change Task Request (Algo#69)
- Status Change Report Request (Algo#70)
- Queued Task Request (Algo#71)
- Status Change USKB LED Request (Algo#74)
- Status Point Notification (Algo#75)
- Analog Point Notification (Algo#76)
- Status Change Display Request (Algo#77)
- Group Control of Points (Algo#78)
- Status Change Alarm Group Inhibit (Algo#79)
- Status Change Alarm Area Inhibit (Algo#80)

Sources of Information on Algorithms

For information on algorithms, refer to:

- The Quick Builder online help for each Algorithm (see “Online Help for Algorithms” on page 195), or
- The *Hardware and Point Build Reference*.

Algorithms #16 and #69 are also documented in the *Application Development Guide*.

Defining Algorithms

To define an algorithm for a point:

1. Select the point item in the Quick Builder item list.
2. In the PV Algo box or the Action Algo box, select the type of algorithm you need to configure.
3. Select the PV Algo tab or the Action Algo tab and complete the fields.

Online Help for Algorithms

Online help for configuring algorithms is available in Quick Builder. For a description of the Algorithm fields, position the cursor in the field you are interested in, and press <F1>.

Viewing Algorithm Configuration Information

After an algorithm has been configured for a point, you can view the algorithm details at a Station via the Point Detail display.

To call up the Algorithm Detail display:

1. Call up the Point Detail display for a point (as described in "Changing Point Configuration via Station Displays" on page 178). The currently configured PV or Action algorithm number is under **Algorithms** at the bottom right of the display.
2. Click the algorithm number and then press <F12> or go to the **View** menu and select **Detail**. The Algorithm Detail display for the selected algorithm appears, with the algorithm block number shown in the title bar of the display.

Note When you use an Algorithm Detail display to change the point configuration data in the server database, the configuration data in the Quick Builder project file will no longer match the server database.

It is good practice to keep the Quick Builder data synchronized with the server data by using the Quick Builder upload function to upload point data from the server database to the Quick Builder project file database.

Finding Free Algorithm Blocks

Algorithm blocks are used to store the algorithm configuration as well as working values required by the algorithm. Algorithm blocks are part of the database.

Details of the number of blocks available can be found in the installation guide.

Algorithm blocks are generally not shared between algorithms so each algorithm attached to each point should be assigned a unique block number, unless you are using algorithms 11 and 12, which need to share block numbers.

To find out which algorithm blocks have been used and which are free, you can run the Point Cross Reference report. This report is described in “Cross Reference Reports” on page 252.

Alternatively, you can use the **alglst** utility to list the free algorithm blocks in the database. For details of running **alglst**, refer to “alglst” on page 494.

9 Configuring Alarm Paging

The Alarm Pager licensable option is a background task that monitors Station alarms to determine which new alarms meet the criteria for paging out and sends the messages to the appropriate pagers.

Paging starts when messages are placed on the queue. First the system checks which connection method is being used: either direct connection to a paging system, or connection by modem to a paging service provider. It then checks that there is communication with the paging system or modem. If paging is through the modem, the system then dials the paging service provider number that has been entered in the communications display and logs on to the provider's network. If paging is by direct connection to a paging system, Alarm Paging logs directly into that paging system.

After successful connection is made, Alarm Paging attempts to send the alarms to all of the pagers nominated for each individual alarm. Each message in the queue can be paged out to up to 100 pagers. Message 'blocks' are sent to each pager in turn, until all messages are sent. If the provider allows it, Alarm Paging sends multiple message blocks at the same time, thus reducing the amount of times it has to call the provider.

When communications are complete, the alarm pager waits for new messages to go on the queue. Each message that is sent is logged as an event in the event file. The event file also logs any communication failures or similar problems.

While the Alarm Paging system is communicating with the provider, every 5 seconds it continues to check the server's alarm queue for alarms which need to paged.

Delay times are provided for normal paging and escalation to allow time for alarms to be acknowledged before being paged out or escalated.

Supported Paging Service Providers

The paging service providers currently supported by the Alarm Paging system are those which use one of the following protocols:

- Paging entry terminal (PET)
- Telocator alphanumeric protocol (TAP)
- UCP protocols UCP 01, UCP 30, or UCP 51

Examples of such providers in Australia are Telstra, who provide a paging service to pagers or a short message service (SMS) to mobile phones; and Link Communications, who also provide a paging service or SMS.

The UCP protocol is used mainly in Europe. The two-digit suffixes refer to the EMI command numbers being used by the provider.

Configuring Alarm Paging

You can configure a number of characteristics of the Alarm Paging system. For example, you can:

- Select the connection method, either to a paging system or by modem to a paging service provider.
- Enter information regarding modem or paging system connections and set a password.
- Configure communications settings.
- View the alarm paging status.
- Enable or disable the pager service.
- View the number of alarms in the alarm queues and clear the queue if necessary.
- Set up escalation, so that paged alarms are automatically sent to another pager if they are not acknowledged within a specified time.
- Determine the information you include in the alarm messages you want the pagers to receive.
- Configure the escalation delay and the delay to page times, to allow time for alarms to be acknowledged before they are paged out.

Only people with a security level of SUPV or higher can configure or change the settings for Alarm Paging.

Alarm Paging Configuration Sequence

It is important to configure Alarm Paging in the correct sequence. For example, a pager must be set up before it can be nominated to receive pager output. Each step in the configuration should be completed before the next is begun.

The configuration sequence is as follows:

1. Connect the modem or paging system to a serial port on the server and configure modem connection details.
2. Configure paging service provider details (including dialing and communication settings).
3. Configure each pager to be used with the system.
4. Nominate the alarms to be paged, the pagers they are to be sent to, and any escalation.

Alarm Paging Settings

This section gives a brief description of the settings on the Communication tab of the Alarm Paging display.

Modem Connection and Dialing Settings

Used for entering or changing modem or paging system connection and dialing settings. For details, see “Setting Up Alarm Paging Communications” on page 202.

Service Provider Communication Settings

Used for entering or changing communication settings. For details, see “Setting Up Alarm Paging Communications” on page 202.

Alarm Paging Status

Select the checkbox to enable Alarm Paging, or deselect the checkbox to disable the system.

Status	*Description*
Disabled	Alarm Paging system has been disabled by deselecting the Enabled checkbox.
OK	Enters the OK state while processing and searching for alarms to page.
Dialing	Changes to Dialing when trying to contact the provider’s phone number.
Paging	After connecting to the provider the, system goes into the paging state until it disconnects.
Failed	Failed state indicates an error in communications. (This is usually indicated by an alarm displayed in the Events or Alarms display.)
Waiting	Enters the Waiting state when the number of automatic redials has been exceeded. (Redial information is as configured in the Alarm Paging display.)

Table 9.1 Alarm Paging Status Definitions

Queued Messages

The Queued Messages values show the number of alarm messages in the main message queue and in the escalation queue. To remove all messages from both queues, click **Clear Queues**.

The number of messages shown in each queue is the number of alarms that are to be paged out, not the number of individual messages sent to individual pagers. For example, there might be ten messages on the queue display but these ten messages might be paged to twenty or more pagers.

Main Queue:

The number is incremented when the server issues an alarm that is configured for paging. The number is decremented when the alarm is paged out to all its configured pagers.

Escalation Queue:

The number is incremented when an alarm for which one or more escalation pagers are specified is paged out. The number is decremented when the alarm is successfully paged out to all its escalation pagers.

If a communications error (such as no available connection) prevents alarms from being paged, Alarm Paging continues attempting to send messages. Messages are not deleted from the queue, and the Queued Messages number is not decremented, until they have been sent. However, if there are 100 messages on the queue and more alarms are found, the oldest queued messages are overwritten.

Delays

The time in minutes between the raising of alarms and their paging or escalation.

Include in Message

Select the types of information you want sent to the pagers.

Multiple Messages

UCP protocol only. Disable or enable sending multiple messages during one dialup session.

Note To set up Alarm Paging, you must be using a Station with a security level of ENGR (or higher). Security levels are described in "Configuring Security and Access" on page 209.

Setting Up Alarm Paging Communications

The Alarm Paging system communicates with the modem or paging system through a serial port. It is important that you do not use this serial port for any purpose other than for paging alarms. The Alarm Paging system automatically sets the communication settings between the serial port and the modem.

Note Do not attempt to configure a modem device using Windows NT, or the Alarm Paging system will not operate correctly.

To assign the modem serial port and service provider settings:

1. From the System Configuration Menu display, click **Alarm Paging**. The Communications tab is displayed.
2. To connect directly to a paging system through a serial port, select the **Direct Connection** checkbox. To connect to a paging service provider through a modem, deselect the **Direct Connection** checkbox.
3. In the **Port** field, type the name of the port used to connect to the modem or paging system (for example, com1).
4. If you are connecting through a modem, type the telephone number of the service provider.

   Include the external access number if required. For example, if you dial 0 to access an outside telephone line from your building, and the service provider's telephone number is 9500 1000, you type `095001000`. (0 followed by the service provider's telephone number.)
5. Set the redial parameters.

   These parameters are generally specified by a local communications authority. The values shown below in parentheses are Australian requirements. Alarm Paging defaults to these values if the entered values are above maximums or below minimums.

   Number of automatic redials

   The number of automatic redials before message failure (maximum 9).

   Delay between redials

   The delay between redials (minimum 2 seconds).

   Delay following maximum redials

   The delay before dialing again after the maximum number of automatic redials has been reached (minimum 30 minutes).

6 Click **Set Password** to set an Alarm Paging password (if required).

The password is usually supplied by the service provider. For example, for PET protocol the password usually has the format "`PG1xxxxxx`", where `xxxxxx` is the password supplied by the service provider. (If the provider does not supply a password, you might still need to set the Alarm Paging password to `PG1`. Check with your provider for details.)

7 Select the appropriate settings from the drop-down list for each of the following:

- Protocol
- Baud Rate
- Data Bits
- Parity
- Stop Bits
- Flow control

Configuring Modem Information

Alarm Paging requires information on how to communicate with your modem. To enter this information, open the Alarm Paging display at the Modem Information tab. The following table discusses the modem information fields on this display.

Changes you enter on the Alarm Paging - Modems display take effect immediately. If necessary, you can restore the default modem information by pressing the **Restore** button. Pressing **Restore** overwrites any information that is currently entered in the Modem Information tab.

The default settings in the following table are correct for the Netcom Roadster.

Property	***Description***
Modem Reset Command	The command needed to set the modem to the default factory settings. The default is **AT&F**. Change to **AT&F0** for modems in List A*.

Table 9.2 Modem Information Fields

Property	*Description*
Initialization Command	The command string needed to set the modem to the settings as required by the provider. The default string is **AT&D0E0X0%C0M0\N0B0** where: **D0** = Ignore DTR **E0** = Local command state echo off **X0** = basic response codes (must include ringing) **%C0** = Compression disabled **M0** = speaker is always off (optional) **\N0** = constant speed mode **B0** = auto-connect Change to **AT&D0E0X1&K0M0&B0** for modems in List A and List B*.
No Flow Control	The command needed to set the modem to No Flow Control. The default is **AT&K0**. Change to **AT&HO** for modems in List A and List B*.
Hardware Flow Control	The command needed to set the Modem to hardware Flow Control. The default is **AT&K3**. Change to **AT&H1** for modems in List A and List B*.
XON\XOFF Flow Control	The command needed to set the modem to Software flow control. The default is **AT&K4**. Change to **AT&H2** for modems in List A and List B*.
Dial Command	The command preceding the phone number which tells the modem to go on hook and dial the provider number. The default is **ATDW**.
Escape Sequence	The command needed by the modem to return from data send mode to local command state. The default is **+++**.
Hang Up Command	The command needed by the modem to replace the hook and hang up the line. The default is **ATH**. Change to **ATH0** for modems in List A and List B*.
Command Successful	The response which the modem issues if the command sent to it was understood by the modem and successful. The default is **OK**.

Table 9.2 Modem Information Fields (Continued)

Property	*Description*
Phone Ringing	The response which the modem issues if it detects that the line is ringing on the other end. The default is **RINGING**. Change to **RING** for modems in List A and List B*.
Connection Detected	The response issued by the modem if it detects that the connection with the provider's modem at the other end is successful. The default is **CONNECT**.
No Carrier Detected	The response issued by the modem if it detects that there is no modem on the other end of the line or if the other party has hung up. The default is **NO CARRIER**.
No Dial Tone Detected	The response issued by the modem if no dial tone is found on the line used by the modem. The default is **NO DIALTONE**.
* Refer to Table 9.3, "List of Supported Modems," on page 205.	

Table 9.2 Modem Information Fields (Continued)

Note The following table of modems is correct as at the publication of this document.

List A	*List B*
US Robotics Sportster 28,800, 33,6	X-Link XL-V336E
3Com U.S. Robotics 56KFax Modem (Model 5676)	ELSA MicroLink 28.8TQV, 2460TL

Table 9.3 List of Supported Modems

Configuring Pager Details

Each pager that is to receive alarm messages from Alarm Paging must be configured on the Pagers tab of the Alarm Paging display:

To configure a pager:

1 In the Name field, type the name of the person (or group) to whom the pager is assigned.

2 In the Phone Number/Pager ID field, type the pager ID number.

This ID is specified by the Pager Service Provider as a unique identifier for the pager you are recording.

If you are using Short Message Service on a mobile phone, then the pager ID is the mobile phone number.

Note Do not enter the phone number of the Pager Service Provider on this display. The service provider's number is entered when configuring the Alarm Paging modem. See "Setting Up Alarm Paging Communications" on page 202.

3 If unacknowledged alarms to this pager are escalated, select the pager that receives them. You can also select a minimum priority for escalation, which means that alarms of the minimum priority or higher are escalated.

Note A pager's availability times also apply to escalated alarms. For example:

- Pager 1 receives alarms from 4:00 p.m. to midnight, Monday to Friday.
- Pager 2 receives alarms from noon to 8:00 p.m. Monday to Friday.
- Pager 1's alarms escalate to Pager 2.
- Pager 2 only receives alarms escalated from Pager 1 between 4 p.m. and 8:00 p.m.

4 Select the time of day and day of week that the pager will be required to receive alarms.

For example, if a pager is required to receive alarms between midnight and 8:00 a.m., Monday to Friday select the following;

Start Time: 0:00
Stop Time: 8:00
Days: M,T,W,T,F (Box for each day must be selected)

Note If both the Start and Stop times are zero, then the pager will not receive alarms at any time.

If a pager is required to receive alarms all day, select the following;

Start Time: 0:00
Stop Time: 24:00
Days: All required days must be selected.

5 Select the holiday schedule that the pager is to follow for receiving alarms.

Holiday availability (H) is linked to the server's Holiday Schedule. A pager that has this availability selected will receive alarms on those dates which are defined as holidays in the server Holiday Schedule.

Repeat the above steps for each of the pagers you want to configure.

Nominating Alarms to be Paged

There are two ways to nominate the alarms that will be sent to each pager. One way is to individually specify every point that is to have its alarms paged. The other way is to nominate the alarms by areas assigned to operators.

Nominating Individual Point Alarms

You use the Specific Alarms tab on the Alarm Paging display to specify the point points that are to have alarms paged out. Up to 10 pagers can be specified to receive the alarm messages for each point. Alarms of the specified priority or higher are paged.

To nominate individual point alarms:

1. Click the Specific Alarms tab on the Alarm Paging display.
2. In the Point ID field, enter the Point ID.
3. Select the minimum alarm priority.
4. Use the drop-down lists to nominate the pagers you want assigned to this point.

Nominating Non-Area Alarms

Non-area alarms such as communication and system alarms can be assigned to pagers.

To nominate non-area alarms:

1. Click the Specific Alarms tab on the Alarm Paging display.
2. Select the Non-Area Alarms checkbox.
3. Use the drop-down list to nominate the pagers you want to assign to the Non-Area Alarms. Up to 10 pagers can be nominated.

Note You must use the Specific Alarms tab to assign non-area alarms to be sent to a pager. If you make a non-area alarm a part of an operator's area profile, the alarm will not be sent to a pager.

Nominating Alarms by Areas

If you are using Operator-Based security, you can also use areas to control which alarms are paged. Alarms are only sent to the pager for the areas assigned to the operator.

For example, a Station operator named Norm Smith might have areas A1, A2, and A3 assigned to him. Only alarms from areas A1, A2, and A3 are sent to any pager configured with Norm Smith's Operator ID.

For information on setting up an operator's profile, see "Configuring Operator-Based Security" on page 216.

To nominate alarms by areas:

1. Click the Pagers tab on the Alarm Paging display.
2. Enter the Pager Name and Pager ID.
3. Enter the Start and Stop Times and Available Days.
4. Use the drop-down list under Areas Assigned to Operator to nominate a Station operator whose profile includes the area you want to assign.
5. Select the Minimum Priority for the alarm.

Enabling Pagers

To enable the pagers you want to use, select the appropriate Enable checkboxes on the left of the Pagers tab.

Alarm Message Content

The content format of each paged alarm is specified on the Communications tab. These are global settings that apply to all paged alarms.

Select one or more checkboxes from the following options:

- Sequence Number
- Date
- Time
- Point ID
- Alarm
- Priority
- Description
- Value
- Units
- Message Text (does not apply to a distributed architecture)

10 Configuring Security and Access

This chapter shows you how to configure security for your PlantScape system. It describes:

- The two main types of security you can use
- How you configure each type of security
- How to use areas to limit access and distribute alarms accordingly

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Note This chapter does not describe how you secure the operating system. For information on securing Microsoft Windows, see the administration guide.

About Security

The security required for your PlantScape system can be divided as follows:

- Windows operating system security
- Station security

When you install the PlantScape software, three Windows accounts are set up. These accounts are required to give users access to the Windows operating system. These accounts are:

- mngr
- engr
- oper

Although these accounts have similar names to security levels and operator accounts in Station, they are separate entities. For more information on Windows user accounts see the Administration and Startup Guide.

Within Station there are two types of security:

- Station-based security
- Operator-based security

In Station-based security there are security levels which are used to restrict operator authority within Station.

In operator-based security there are operator accounts which are used to restrict operator authority within Station. Authority is controlled using the same security levels used in Station-based security.

If your system is divided into areas, you can further restrict operator authority by restricting the level of access to areas. Access to areas uses a separate set of security levels.

Station-based security, operator-based security and areas are discussed further in this chapter.

Understanding Station Security

When you define a Station, you also define the security method that will control access to functions at that Station. In Quick Builder, you choose between:

- Station-Based security
- Operator-Based security

Your choice of security method for each Station determines:

- Whether or not users need to sign on to that Station with a special user ID and password
- The security level setting used when that Station starts up
- The total number of security levels available to your system
- The tasks you need to carry out to configure Station access

About Station-Based Security

Station-Based security is the default used for Station access. Station-Based security works as follows:

- Station starts without prompting users to enter any form of user ID or password.
- The initial security level setting allows users to perform the basic operating functions associated with the user level of OPER (for example, acknowledging alarms and controlling points).
- Users only need to use a password if they want to change to a higher level of security.
- Area assignment applies to the Station, not to the operator.

The security levels and their associated functions are described in "About Security Levels" on page 212.

About Operator-Based Security

Operator-Based security provides a higher level of security than Station-Based security. Operator-Based security works as follows:

- You assign a specific security level to each user.
- Users cannot access any Station functions unless they enter a valid ID and password.
- To access a higher security level than the one they are currently using, users need to sign off and sign on again as a different operator who has the higher security level.

- Areas are assigned to the operator, irrespective of which Station they are currently logged on to.

Operator-Based Security and Point Control

You can specify a **control level** for a point when it is configured in the server database. (Control levels for points are described in "Control Properties" on page 149.)

When Operator-Based security is used at a Station, an operator must have a control level greater than or equal to the control level defined for a selected point in order to be able to control that point.

About Security Levels

The current security level of a Station is displayed in Status Line (right-hand side). If no operator is signed on to the Station, this part of the Station Line is blank.

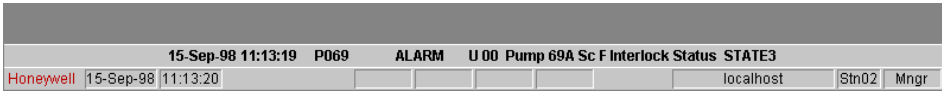


Figure 10.1 Status Line Showing the Current Security Level Setting ("Mngr")

You can use up to six different security levels in PlantScape. These levels are shown in the following table in ascending order of access.

Default Security Level Acronym	***Default Meaning***
LVL1 (Only available with Operator-Based security)	View-only mode
LVL2 (Only available with Operator-Based security)	Alarm acknowledgement mode
OPER	Operator mode
SUPV	Supervisor mode
ENGR	Engineer mode
MNGR	Manager mode

Table 10.1 Security Levels

If you have configured a Station to use Operator-Based security:

- The Station prompts you to sign on, and you cannot access any Station functions until you have successfully signed on.

If you have not configured a Station to use Operator-Based security:

- The Station starts at a security level of OPER, but you need to enter a password if you want to access a higher level of security.

The security levels OPER through MNGR can be assigned to server functions. In order to use the function, the current security level used to run Station must be equal to or greater than the security level assigned to the function. For example, a push button on a display might be assigned a security level of SUPV when a custom display is built. In order for an operator to use the push button, the Station security level must be either SUPV or MNGR.

Setting Security Levels for Enabling/Disabling Channels and Hardware

Security levels are also used to define which level of security is required to enable or disable hardware items.

To set the minimum security level required for enabling or disabling:

1. From the System Configuration Menu display, click **Server Wide Settings**.
2. Under **Enable/Disable Hardware**, select the security level you want to set for this operator function.

When you call up the Channel Status Summary and the Controller Status Summary display (as described in 6.5 “Enabling and Disabling Channels and Controllers”) you will not be able to use the **Enable** checkboxes in these displays unless you are currently logged on at the security level specified.

Note This enable/disable security level setting applies to every Station in your system.

Configuring Station-Based Security

If you have opted for the Station-Based security method, it is recommended that you change the default passwords (one each for ENGR, SUPV, and MNGR) that were installed as part of the PlantScape installation process.

Under Station-based security, only levels SUPV, ENGR, and MNGR require passwords because:

- LVL1 and LVL2 are not available.
- Users can access OPER level without entering a password.

Setting and Changing Passwords for Security Levels

Default passwords are set for ENGR, SUPV, and MNGR at each Station as part of the installation process. These default passwords are the same as the acronym used for that security level; for example, the default password for MNGR security level is `mngr.`

To change a Station password for ENGR, SUPV, or MNGR:

1. Log on to the PlantScape server with a Windows account that belongs to the Honeywell Administrators group.
2. Open a **Command Prompt** window.
3. At the command line, enter the following command:

   `paswrd`
4. Specify the Station number as follows:

   `C`*`nn`*

   where ***nn*** is the number of the Station for which you want to change the password(s)
5. Enter the number for the security level for which you want to change the password:

   1 for SUPV

   2 for ENGR

   3 for MNGR
6. Type the new password. The password can be either 5 or 6 alphanumeric characters.

   Note Passwords are case-sensitive.
7. Enter **`Q`** (for quit).

Using Passwords in Station-Based Station Security

To access functions that are associated with security levels higher than OPER:

1. Start up Station if it is not already running.
2. Type **psw** in the command zone and press <Enter> (or click the Security Level displayed in the Status Line). The Station Logon dialog box opens.
3. Enter the password for the desired security level and click **OK**.

Configuring Operator-Based Security

If you wish to use Operator-Based security, you need to:

1 Specify Operator-Based security for each Station that is to use this security method.

2 Define each operator who needs to access these Stations.

Enabling Operator-Based Security

You specify Operator-Based security for a Station when you define the Station connection in Quick Builder.

The procedures for defining a Station connection in Quick Builder are described in the *Quick Builder Guide*. If necessary, refer to the *Quick Builder Guide* for assistance in completing the following instructions.

To define Operator-Based security for one or more Stations:

1 Start Quick Builder, if it is not already running.

2 Open the project file that contains the configuration data for the Stations.

3 In the item list, select all the Station items that are to have Operator-Based security.

4 Go to the Main tab, and select the **Operator-Based Security** checkbox.

A check mark in the box means that Operator-Based security is enabled for the selected Station(s).

Defining an Operator

The server software is installed with a default operator ID of `mngr`. The security level for this operator ID is MNGR.

You use this default operator ID and password to set up access for all other users as follows:

1 Start Station, if it is not already running.

If Operator-Based security is enabled for this Station, as described in the previous topic, the Station display starts up with the Station Logon dialog box.

2 To sign on as `mngr`, enter the ID, **mngr**, and the relevant password and click **OK**.

3 From the System Configuration Menu display, click **Operators**. This displays a list of all the operators currently defined in the system.

To add an operator to the system:

1. Click an unassigned operator ID position in the **Operator ID** column. This opens the Operator Configuration display.
2. For the operator you want to add, type the appropriate information into the text fields. Make certain you type a unique operator ID of no more than four alphanumeric characters for the operator.

Tip *You can use the dropdown list at the top of the Operator Configuration display to view or change the details of any operator who has already been entered into the system.*

The Operator Configuration display is used to define the details for a new operator or to amend the details for an existing operator. You enter information in each field as follows:

Property	***Description***
ID	A unique identifier for the operator. You can use a maximum of 4 alphanumeric characters Operator IDs are also recorded with events. Whenever an operator makes a change at a Station (for example, to control a point, acknowledge an alarm) and that change is logged as an event, the operator ID is recorded with the event.
Name	The operator's name.
Title	The operator's title, if applicable.
Area	Required if you are implementing area restrictions, use this field to specify the area code required for viewing this operator's configuration details. Only Stations or operators with access to this area are permitted to view the details display for this operator.
Multi-user	When this checkbox is selected, this operator ID can be used to log on concurrently on multiple Stations.
Password	Use the **Change Password** button to change the operator's password. **Note:** Passwords are case-sensitive.
Authority	Select the security level assigned to the operator. (Security levels are described in "About Security Levels" on page 212.)
Control level	Defines the control level assigned to the operator (from 0 to 255). The default is 255. The operator's control level determines whether or not the operator is permitted to control a point. (For more about point control, see "Control Properties" on page 149.)
Printer Assignment	The classes of alarms and events that are printed on a Station's printer when the operator is logged on to the Station.

Property	*Description*
Area Assignment Tab	Opens the Area Assignment display for that operator. Use the Area Assignment display to view or define the areas that the operator can access. For more information, see "Using Areas to Control Access to the System" on page 222.

Modifying Operator Configuration Details

To modify an operator ID and other details, change the **ID** field under Operator Definition in the Operator Configuration display. Any changes made to the configuration details of an operator are not effective until the next time the operator signs on to PlantScape.

Deleting Operator Configuration Details

You can delete an operator record by clearing the **ID** field under Operator Definition in the Operator Configuration display.

Note Deleting an operator ID deletes all the details and permissions of the operator.

About Operator Passwords

For security reasons:

- Operator passwords are encrypted.
- The 10 most recently used passwords cannot be re-used within a configurable time period.

The validity period for passwords defaults to one month, but this setting can be configured as required.

Password Administration

To change or configure a password:

1. From the System Configuration Menu display, click **Operators** to call up the Operator Configuration Summary display.
2. Click the Sign-On Admin tab to call up the Sign-On Administration display.
3. Enter a new password expiry and validation period on this display.

Property	*Description*
Password Expiry Period	Operator passwords will expire after this number of days, and a new password will be required.
Password Validation Period	PlantScape does not allow operators to reuse any of their 10 most recently used passwords unless the password was changed at least as many days ago as specified in this field.
Change Operator Configuration Security Level	Defines the security level required to change operator configuration. See "About Security Levels" on page 212.
Number of failed logins before lockout	Specifies the number of unsuccessful login attempts permitted before Station lockout.
Lockout time	The operator Station will stay locked out for this period of time after the specified number of failed logins.

Operator Failed Login Alarms

An alarm is raised when an operator enters an incorrect password or when the number of specified login attempts is exceeded. You can set the priority of these alarms. You might want to set the priority of an operator lockout alarm to Urgent while you might want to set the priority to journal when an operator enters an incorrect password.

To set the priority of operator alarms:

1. On the **System Configuration Menu** display, click Alarm and Point Processing.
2. On the **Alarm and Point Processing** display, click the Alarm Priorities tab.
3. On the **Alarm Priorities** display, set the required priorities for **Operator Logon**. The Operator Logon alarm indicates when an operator has entered an incorrect password.
4. On the **Alarm Priorities** display, set the required priorities for **Operator Lockout**. The Operator Lockout alarm indicates the operator has exceeded the number of login attempts and does not have access to the PlantScape system.

Locking Stations in Full Screen and Disabling Menus

You can restrict access to non-Station software on an operator Station by implementing one or more of the following security measures:

- Lock the Station window in full screen so that users cannot resize the window or access operating system functions and non-Station applications.
- Disable the **Exit** menu choice so users cannot close down this Station.
- Disable the **Setup** menu choice so that users cannot change the connection or display settings for this Station.
- Disable the **Connect** menu choice so that users cannot attempt to connect to a different server and disconnect from the current server.

Access to Intranet and Internet sites is disabled by default on Station. For information on enabling full or restricted access via Station's SafeBrowse feature, see "Web Access Tab" on page 71.

There are also a number of operating system-based security measures that you can implement to prevent unauthorized access to a computer's operating system and non-Station software. For information about securing Windows systems, see the administration guide.

Changing the Station Command Line

To lock the Station window in full screen and to disable menu choices, you need to use various switches to change a Station's command line.

The syntax options for a Station command line are as follows:

```
Station [-s[f][x][s][c]]
```

where:

`-sf`	Disables window resizing so that Station can only operate in full screen mode
`-sx`	Disables the Exit menu choice
`-ss`	Disables the Setup menu choice
`-sc`	Disables the Connect menu choice

For example, to use `opsetup.stn` as the default setup file for this Station, and to disable the **Exit** and **Setup** menu choices, enter:

```
station.exe opsetup.stn -sxs
```

There are a number of other command line options, such as specifying the name of the setup file that you want Station to start up with (see "Starting Station" on page 63.) For details of other command line options, refer to "station" on page 504 in "Command Reference" on page 483.

To change a Station's command line:

1. Right-click the **Start** button.
2. Select **Open All Users**.
3. Double-click the **Programs** icon.

   If Station is running on the PlantScape Server computer, double-click the **PlantScape Server** icon to show the Station icon.

   If Station is running on a client computer, double-click the **PlantScape Client Software** icon.
4. Right-click the **Station** icon and select **Properties**. This displays the Station Properties dialog box.
5. In the Properties dialog box, modify the **Target** field to include any of the parameters required for Station.

Using Areas to Control Access to the System

When you assign areas, you control the level of access to an area by setting the security level. Area security levels are used in conjunction with the existing operator-based or Station-based security.

For example, if an area is defined with an area code of A1, all point IDs with an area code of A1 would only be viewable by Stations or operators that have area A1 assigned to them with an access level of at least View.

Note

- Alarms in an area can be temporarily disabled using the Status Change Alarm Area Inhibit algorithm. See "Configuring Algorithms" on page 193 for details.
- If areas are assigned to points or processes that are currently in alarm, these existing alarms will not observe area restrictions. It is therefore recommended that areas be configured before points are defined or else when there are no alarms affecting points and processes in the areas you are creating.
- Area number **1** is reserved for system item alarms and alarms for points that have not been assigned to an area.

Assigning Areas to Stations

To assign areas to individual Stations:

1. From the System Configuration Menu display, click Areas.
2. Click **Station Area Assignment**. This opens the Station Area Assignment tab for individual Stations.
3. For each Station, click the checkbox for each area the Station should access and select the level of access for each area.

Tip *To assign or change areas for different Stations, use the drop-down list of Stations available above the Area Assignment tab.*

Assigning Areas to Operators

To assign areas to individual operators:

1. From the System Configuration Menu display, click Areas.

2 Click **Operator Area Assignment**. This opens the Operator Area Assignment tab for individual operators.

3 For each operator, you can select an area profile from the list (see "Area Profiles" on page 93) or you can select the areas the operator needs to access and the level of access for each area.

Tip *To assign or change areas for different operators, use the drop-down list of operators available above the Area Assignment tab.*

Assigning System Area Items and Alarms

Some items, such as printers, channels, and controllers, are automatically assigned to the system area (area number 1). They still require alarming and might still need to be accessed by Stations and operators.

- To enable alarms on system items, open the Areas display and select **Enable Alarms** for the system area (area code 1).
- To assign a Station access to system items that are scanned on the local server, open the Station Area Assignment tab and select the checkbox for the system area (area code 1).
- To assign an operator access to non-area items that are scanned on the local server, open the Operator Area Assignment tab and select the checkbox for the system area (area code 1).

Assigning Areas to Displays

Access to custom displays can also be restricted using areas. An area code is assigned to a custom display when it is built. For details on how to build custom displays, see the *Display Building Guide*.

Distributed Server Architecture and Areas

To assign a Station or an operator to a remote area, select the checkbox for the remote area. The remote area must be defined on the Station or operator's local server.

To enable access to non-area alarms or items on a remote server:

1 On the remote server, assign an area code to the system area (area 1).

2 Assign the area code of the remote system area to the Stations or operators that need it.

Changing the Names of Security Levels

You can change the default names (`OPER`, `MNGR`, and so on) that are used to identify each security level, and which are displayed in Station's Status Line. The default name for security levels are PlantScape acronyms that can be changed via the System Acronym Configuration display.

To change the security level acronyms:

1. From the Station menu select **Configure ⇒ Acronyms ⇒ System**. This calls up the System Acronym Configuration display.

   Acronym numbers 265 through 270 are used for the default security levels.
2. Click the acronym field that you want to change and type in a new 4-character acronym.

Note

- Any changes you make to default security level names will be overwritten when you upgrade PlantScape. If you do not use the default names for security levels, you need to repeat the above process every time you upgrade PlantScape.
- Acronyms are more commonly used in building custom displays. For information about how acronyms are used in custom displays, refer to the *Display Building Guide*.

11 Configuring Group and Trend Displays

This chapter describes how you configure two types of standard displays that can be used for grouping information and showing trends:

- Group displays
- Trend displays

These displays require only minimal configuration and provide a convenient way for operators and other users to view information about a group of related points on a single display.

Group displays and Trend displays are standard displays available with every PlantScape installation, but it is not mandatory to use them. You might prefer to use custom displays instead of (or as well as) standard displays.

For example, instead of using the standard Group display, you can create your own customized Group Detail displays. When configuring points, you can then specify a custom Group Detail display to be called up.

For more information, see “Configuring Station Displays for Points” on page 175. For information on defining displays for points on Honeywell Control Processors, refer to the *PlantScape Process Control Building Guide*.

For information about building your own custom displays, see the *Display Building Guide*.

Configuring Groups

You can only configure groups after you have configured points for your site.

To configure groups, you need to be using Station with a security level of SUPV (or higher). Security levels and the procedures for changing security levels are described in "Configuring Security and Access" on page 209.

About Groups and Displays

When you configure groups, information for up to eight related points can be viewed on a single Station display.

Each group (and display) can contain a mixture of point types: analog, status, accumulator, and flexible points.

The total number of groups you can create depends on the size of your database. See the installation guide for information about the relationship between database size and the number of available groups.

By configuring groups for your site, you can access the following standard display types in addition to the standard Group display:

Group Detail	Showing point detail type information about the points in the group
Group Trend	Showing trend information for each point in the group
Group Numeric History	Showing numeric history information for each point in the group (Group Numeric History display)

These displays are described in detail in the *Operators Guide*.

Figure 11.1, "Group Detail Display" on page 227 shows an example of a typical Group display.

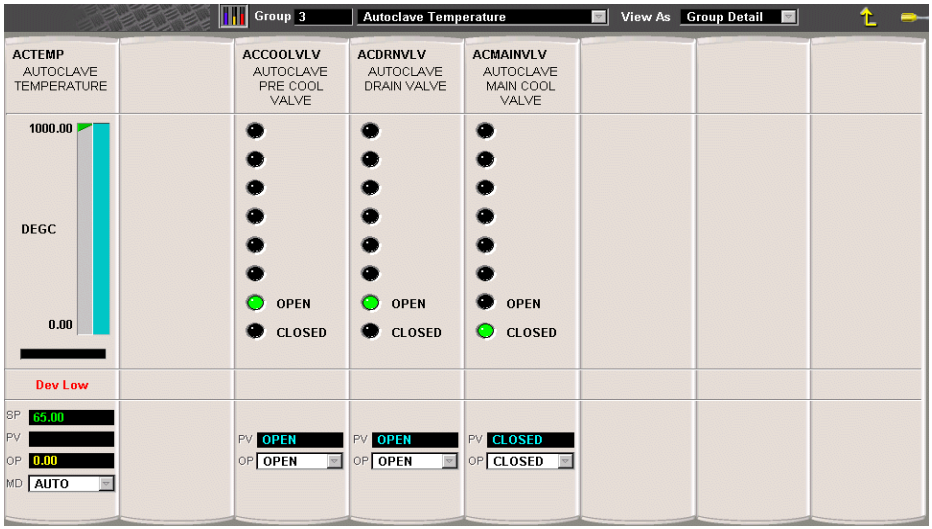


Figure 11.1 Group Detail Display

Creating Groups

To create new groups (or display information about existing groups), click **Groups** on the System Configuration Menu display. This calls up the Group Configuration Summary display.

The Group Configuration Summary display is used to list groups configured for your site. From this display you can access the details of any group already in the system. You can also open a blank Group Definition display for adding a new group.

To add a new group:

1. From the System Configuration Menu display, click **Groups** to call up the Group configuration Summary display.
2. Click an unassigned area in the **Title** field beside a group number. This calls up the Group Configuration display for that group.
3. In the Title field enter a title for the group you are creating.
4. Enter the point IDs for the points you want to include in the group. Point descriptions are entered automatically.

5 From the drop-down list of parameters, select the parameter that you want shown in the group trend and group numeric history for each point. This parameter should be PV for standard points, or the equivalent for flexible points.

Note Selecting a parameter other than PV (or equivalent) does not change the parameter shown on the faceplates in the group displays.

6 Click the **View Group** link to call up the Group Detail display for this group.

Modifying Groups and Points

To change the name of an existing group, you can edit the **Title** field under **Definition** in the Group Configuration display for that group.

You can also change the points assigned to a group using the **Point IDs** field.

Deleting Groups and Points

In the Group Configuration Summary display, under **Title**, click the name of the group you want to delete. This calls up the Group Configuration display for that group.

Under **Definition**, click the **Title** field and press <Delete> to remove the group from the active list of groups.

To delete any point currently assigned to a group, select the point you want to delete in the relevant **Point IDs** field, and press <Delete>, then press <Enter>.

Navigating to Group Displays

When calling up a group display, you can use:

- Standard navigation methods
- Custom navigation methods

Standard Navigation Methods

Standard navigation methods require no configuration. They are listed below because you might want to use them when checking a group configuration or display.

The following standard methods can be used to call up a group display:

- Go to the Group Summary display click the name of a specific group to call up. When the Group Configuration display for a specific group is displayed, click the **View Group** link to view the group.
- Click the Group icon on the Station toolbar and type a group number in the Station command zone and press <Enter>.
- Press <F6> to call up a group by number.
- In the Station command zone of any display, enter the GRP command and the number of the group you want to display then press <Enter>.
- In any Group display, change the current number in the **Group** field to the number of the another group to display. Or choose another group from the list of titles at the top of the display.

These standard methods are described in detail in the *Operators Guide*.

Custom Navigation Methods

Alternatively, you might want to configure one of the following custom call-up methods to provide a quick and easy way of calling up a display:

- User-defined Station function keys
- Button objects on a custom display

Details on user-defined function keys are stored in the Station setup file. For details on configuring user-defined function keys, see "Customizing Toolbars, Menus and Function Keys" on page 64.

For details on configuring buttons on custom displays, see the *Display Building Guide*.

Configuring Trend Set Displays

Trend set displays are standard Station displays that provide a way of viewing historical data for points.

Trend set displays complement other types of displays that can be used to view historical data such as point detail trends, group trends, and custom display trends.

About Trend Set Displays

The number of trend sets available in your system depends on the server database sizing. For details about database sizing, see the *Installation Guide*.

Trend Sets and Point History

Trend Set displays (and other types of Trend displays) show historical information for points. In order to configure and use the Trend Set displays effectively, it helps if you understand how PlantScape collects point history. Point history collection is described in "History Collection and Archiving" on page 167.

When a point parameter has been configured for history collection, it is sampled and stored in the server database history files. The Trend displays show the history data contained in these files.

When configuring a Trend Set, you need to specify the required history interval to be viewed. (History intervals are the periods between snapshots and period averages used in collecting history.)

Trend Sets and Point History Archiving

The point history archive files are automatically searched to display history data for a specified time and date on a Trend Set display.

For details on archiving point history, see "Configuring History Archiving" on page 170.

Using Trend Set displays

The procedures for using a Trend Set display (zooming, scrolling, and getting a value readout) are described in the *Operators Guide*.

Trend Set Display Types

The following standard Trend Set displays are available:

Single Trend	Used to display a bar graph of historical data for a single point
Dual Trend	Used to display bar graphs of historical data for two points
Triple Trend	Used to display bar graphs of historical data for up to three points
Multiplot Trend	Used to display a line graph of historical data for up to eight points
Multirange	Used similarly to the Multiplot Trend but enables the display range of each of the eight points to be individually configured
X-Y Plot	Used to display an X-Y plot of the historical data for two analog points with one point's values plotted against the others
Numeric Trend	Used to display a list of the historical data for up to eight points in a numerical format

Related Display Types

The Trend Set displays complement other types of trend displays that are used to view historical data:

Detail Trend display Accessible directly from a Point Detail display. It requires no configuration and shows a bar graph display of historical information for a single point.

Group Trend display Accessible from a Group Detail display. Once the group itself is configured, no configuration of the Group Trend display is required. It gives a multi-plot trend of the points in the group. The points can be trended and controlled from the same display. This enables the downstream effect of point controls on cascaded functions to be observed on a single display.

To call up an Group Trend display, click the **View Trend** link in the bottom right corner of the relevant Group Configuration display.

Custom Trend display Trends can be added to custom displays. For details, see the *Display Building Guide*.

About the Configuration of Trend Sets

Trend sets are easy to configure. You only need to enter the point IDs and specify the type of history details you want to view.

You use a Trend Set Definition display to create a new trend set, but trend sets can be modified directly from a Trend Set display. This makes it easy for operators to change the trend set configuration interactively in order to analyze process history.

By default, an operator can change the configuration of a trend set while it is being displayed. To restrict the ability to change the points or parameters in a trend set display, set the **MNGR or ENGR security level required to change traces** checkbox.

Tip *You can use the list in the Trend description field at the top of the Trend Set display to choose a different trend to view.*

Creating Trend Sets

To add a new trend set to the list:

1. From the System Configuration Menu display, click Trends.
2. In the Trend Set Summary display, click an unassigned area in the **Description** column. This opens the Trend Set display for a specific trend.
3. In the **Title** field, enter the name of the trend.
4. Select a trend set type from the **Trend Type** list.
5. In the **Sample Interval** field, select the desired history interval from the list (for example, 1-minute snapshots, 6-minute averages, and so on).
6. In the **Trend Range** field enter the range you want to display. Note that this is for display only and does not affect the actual range of the point.
7. In the **Samples** field, enter the number of samples to be displayed. This number must be a value from 1 to 1000.
8. If you want to prevent operators from changing the configuration of the trend set, select the **MNGR or ENGR security level required to change traces** checkbox.
9. Under **Traces**, enter the point ID of each point you want to add to the trend set.
10. Use the **Parameter** drop-down list to select the point parameter to be trended for each point.
11. To enable or disable the trend for each point, click the **Pen on/off** checkbox.

12 If a history offset is required, under **History** enter the time in HH:MM format and the date in DD-MMM-YY format in the **History offset** fields. Otherwise, you can leave this field blank.

13 Click **View Trend** to call up the Trend Set display in which you can change details interactively for this trend set.

14 In the Trend Set display, use the **% /EU** box (see Figure 11.3, "EU/% Toggle Box and Range Fields" on page 234) to toggle between displaying the trend in % (percentage terms) or EU (engineering units), if necessary.

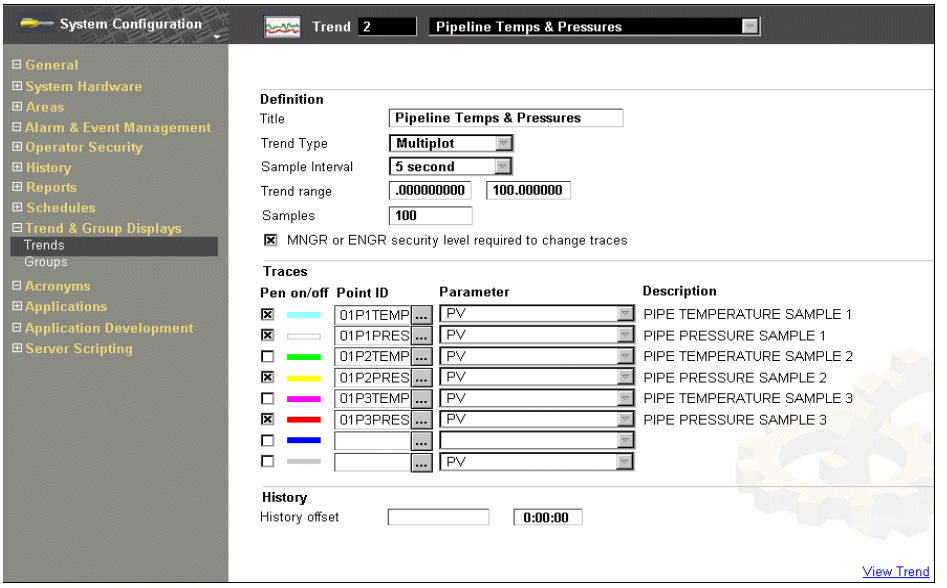


Figure 11.2 Trend Set Definition Display

Changing Trend Sets

Trend Sets are designed so an operator can change the way information is displayed directly in the Trend Set display.

Use the list fields at the top of the display to change the:

- Type of Trend Set
- Number of Samples
- Sample Intervals

You can also change information in the following fields:

- Point IDs
- Parameter of a point
- History Offset

You can use the **% /EU** box to toggle between displaying the trend in % (percentage terms) or EU (engineering units). If you are using EU, enter the high and low range values (in engineering units) in the fields above and below the toggle box.

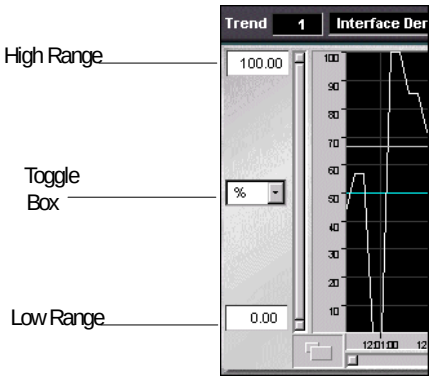


Figure 11.3 EU/% Toggle Box and Range Fields

Configuring Multirange Trend Set Details

A Multirange Trend Set is similar to a Multiplot Trend Set except that the range displayed for each point can be configured independently.

ToconfigureaMultirangeTrendSetdisplay,calluptheTrendConfigurationdisplayandset the Trend type to Mulitrange. Configure the trend as described in “Creating Trend Sets” on page 232.

You use the Multirange Trend Set Details display to enter the trend ranges to be displayed for each point. Note that the trend ranges are only used for displaying this trend and do not affect the actual range of the point.

Changing from **%** to **EU** will reset the ranges to each point’s actual range. Changing the trend type from multiplot to multirange will reset all the ranges to the minimum and maximum of the trend points.

The range shown on the trend axes can be changed to any one of the trend points by selecting the point ID, description, range, or value.

Calling Up Trend Set Displays

In addition to the standard methods available to call up trend sets, it is also possible to configure other methods to call them up.

The following custom methods can be configured:

- A user-defined Station function key
- A push-button object on a custom display

For details on configuring user-defined function keys, see "Customizing Toolbars, Menus and Function Keys" on page 64. For details on configuring push buttons on custom displays, see the *Display Building Guide*.

12 Template Displays and Container Points

A template display is a custom display that is used to represent a unit of equipment containing several points of one or more fixed types. A template display is functionally equivalent to the supplied Point Detail displays for status, analog, and accumulator points.

To use a template display, you first define a container point for the unit of equipment. The container point operates as a custom point type for a unit of equipment, such as a compressor or a door, that contains several points of one or more fixed types. For example, you might have a number of compressors that all contain:

- An analog point to monitor the pressure
- A status point to control the motor
- An accumulator point to monitor hours run

"Compressor" container points tie these sets of points together so that each set can be managed as a single point.

For information about how to define container points, see the Quick Builder online help. For information about building custom displays, see the *Display Building Guide*.

Engineering Guidelines for Container Points

Container points behave like fixed type points, with the following exceptions:

- Alarms raised on a contained point are not promoted to its container point. This means that a container point never goes into alarm, and therefore never appears on the Station Alarms display.

  To ensure that operators can quickly recognize an alarm on a container point, you might:

  - Include the Point ID of the container point in the description of all the points it contains.
  - Configure the Associated Display for all contained points as the template display specified for the container point.
- You cannot attach an algorithm to a container point.

13 Configuring Reports

PlantScape reports provide a simple and flexible way to extract information from the server database.

This chapter begins with an introduction to the various types of reports used in PlantScape. It then describes how you call up a summary on reports and how you configure the reports (“Configuring a New Report” on page 243).

The reports that are available as part of PlantScape are pre-formatted reports that can be configured via Station displays (see “Report Types” on page 240). You can also configure custom reports. Microsoft Excel and Free-format custom reports are available in PlantScape. This chapter also includes information on how to configure these report types.

Report Types

Pre-formatted

You can choose from the following types of pre-formatted reports for retrieving information from the PlantScape server database.

Alarm and Event

Alarm and event details from the event file. This report enables you to analyze alarms and events that occurred during a specified time span on specific points. Excludes remote points. See “Alarm and Event Reports” on page 248.

Alarm Duration

The duration of alarms and events on nominated points during a nominated time span. Excludes remote points. See “Alarm Duration Reports” on page 250.

Cross Reference

Where points are referenced in the server database. The report lists the following types of references for the nominated points: custom displays, trend sets, algorithms, reports, operating groups, history gates, source address for another point, application program point lists. Excludes remote points. See “Cross Reference Reports” on page 252.

Downtime Analysis

This report is only available if you are licensed for the Downtime Analysis option. The report is used to record plant delays that occurred during a nominated time span. Excludes remote points. For information on configuring Downtime Analysis reports, see “Configuring Downtime Analysis” on page 375.

History Archive

The History Archive creates archives of point history; it does not produce text output. Excludes remote points. For more information, see “Configuring History Archiving” on page 170. This report type is supported for backward compatibility only.

Point Attribute

Points that are in a specified state; for example, you can generate a report on all points that are off-scan, have alarms inhibited, have a bad PV, or are in manual mode. Excludes remote and flexible points. See “Cross Reference Reports” on page 252.

Sequence of Events

Some types of controllers, such as the TDC 3000 PIU, have the capability to time-stamp events to millisecond resolution. When this capability is used, the server stores the high resolution event information in the server "sequence of events" file. The Sequence of Events Report is based on data extracted from this server file. Excludes remote points. See "Sequence of Events Reports" on page 257.

Batch Reports

Batch reports are used to collect history for a set of points and events for an area for the duration of a production run. See "Batch Reports" on page 258.

Additional Custom Reports

Microsoft Excel

This report type enables you to run a customized report created using Microsoft Excel. The server database can be accessed through the ODBC driver or Microsoft Excel Data Exchange. See "Microsoft Excel Reports" on page 265.

Free Format

Free Format reports are only available with the Free Format Report Writer Option. This option enables you to design customized reports that can read and write from the server database.

ODBC Data Exchange

This option is only available if you are licensed for ODBC Data Exchange. This report enables the two-way exchange of data with local or remote SQL databases. Point value, point history and user file data can be exchanged.

Configuring Reports

The starting point for configuring a report is to call up the Reports display on a Station. Either:

- On the System menu bar, choose **Configure ⇒ Reports**, or
- Press <F1> to call up the System Menu display and click **System Configuration**. From the Configuration Menu display, click **Reports** in the Navigation Panel.

The Reports display shows the reports that are configured for your site. If you have not yet configured any reports this list is empty.

To add or modify a report configuration, you need to be using a Station with the appropriate security level. Security levels and how you can change them are described in "Configuring Security and Access" on page 209.

Report configuration uses a display with three tabs, a Definition tab, a Content tab and a scripting tab.

The fields in the Definition tab are the same for all report types; they are discussed under "Configuring a New Report" on page 243.

The fields in the Content tab depend on the report type, and are discussed under a separate heading for each type. However the section, "Entering Report Content Configuration Details" on page 246 describes some data entry features that apply to content configuration for all report types.

The scripting tab allows you to create scripts for reports. For more information on scripts see the *Server Scripting Reference*.

How Reports Are Used

After you have configured reports for your site, operators and other users can request these reports. Reports can be printed, viewed on a Station display, or saved in a file.

You can request a report from a configuration display by selecting the report you want from the Reports display then clicking the **Request** button on the Definition or Content tab. (If you want to know more about how operators can call up and request reports, refer to the operators guide.)

You can also configure reports to be requested:

- By selecting a button on a custom display. See the *Display Building Guide* for details.
- By pressing a function key. See "Customizing Toolbars, Menus and Function Keys" on page 64 for details.
- As a result of a process event. For more details, see the description of the Status Change Report Request algorithm in "Configuring Algorithms" on page 193.

Configuring a New Report

To add a report to your system:

1. From the Reports display, decide on a report number for the report you want to configure. You can choose either the first available unassigned report row under **Report**, or any empty report row in the display.
2. Click the row for the unassigned report number you want to use. This calls up the Report configuration displays.

Configuring Definition Details

The fields in the Definition tab specify the general characteristics of the report. The following list shows all fields that can appear in a definition. Not all fields apply to all types of report.

Type

Select the report type you want from the drop down list. The choices are:

- Alarm and Event
- Alarm Duration
- Cross Reference
- Downtime Duration
- Free Format
- History Archive (for backward compatibility only)
- Microsoft Excel
- ODBC Data Exchange
- Point Attribute
- Sequence of Events
- Batch Report

Note The History Archive type does not generate a report, but creates an archive of process history. See "Configuring History Archiving" on page 170 for information.

Name

The name to be used when the report is requested by name. For example, you might want to use a more specific description such as “Shift1” for the report name.

You can use a maximum of 10 characters. The name must be unique to this report and must not contain any spaces.

Title

The report title to be shown on the report output and the summary display. The title can be up to 70 characters. For example, you might want to use a general description such as “Alarm and Events Report for Area AB” for the report title.

Area

If you want to ensure that only operators or stations that have access to a particular area can view or request the report, enter the area code. (For information about controlling system access, see “Configuring Security and Access” on page 209.)

Request Program LRN

The LRN of an application program to be requested after the report is completed. LRNs are briefly described in “Server Display Program” on page 75 and “Keyboard Service Program” on page 89. For more detailed information about LRNs and application programs, see the *Application Development Guide*.

Reporting on Request

Enable Reporting on Request

Reporting on request means that operators and other users can run the report at any time they need it. To configure a report to be run on demand, select **Enable reporting on request** and complete the remaining fields in that area of the display.

When users request a report, they can view the report on screen at the Station they are using, and they can also request that the report be printed.

Destination

Select **Station Default Printer** if you want the report printed on the default printer defined for this Station (for information about configuring the default demand report printer for a Station are described in “Printer Assignment” on page 81).

OR

Select a different printer from the **Destination** list.

OR

Select a file type for the output file. If you select a file type, the report will not be printed.

Periodic Reporting

Enable Periodic Reporting

Select this check box if you want the report to be run automatically at specified intervals. If the report is requested by Algo 70 and you want the report printed, you need to select this check box.

Destination

Choose a printer for the periodic reports from the **Destination** list.

Next Report

The time and date that the report should run next.

Interval

To specify the frequency of periodic reporting, click the **Interval** list and select the desired interval. The interval can be: none, hour, shift, day, week, month, quarter or year.

If you specify an interval, the server will calculate the next run time automatically. Every time the report runs, the next run time is recalculated. If this calculation gives a date that does not exist, the run time is set to the beginning (not necessarily the 1st) of the next month. For example, the next run time for a monthly report scheduled for 31-Jan is calculated as 3-March, because 31-Feb does not exist.

Operator ID

To limit the areas from which data is reported, specify the ID of an operator who is assigned the areas you want to include. **Operator ID** does not apply to all reports, but when the field is visible you must specify an ID.

Report Output

Even if they are sent to a printer, reports are also always written to a file. The file names used are:

`server\report\rpt`*`nnn`*`.htm`

where *nnn* is the report number

For example:

`server\report\rpt001.htm`

Each time the report runs, it overwrites this output file using current data. Operators can use the "pr" command to view and print an existing report through Station (for details, see the *Operators Guide*). Anyone who has access to Windows can view and print the file through Microsoft Internet Explorer.

Entering Report Content Configuration Details

This section describes some data entry features that apply to content configuration for all report types. See "Report Types" on page 240 for a description of the report types.

Using Wildcard Characters to Specify Report Data

A number of the Content tabs allow you to search for specific information. Since the general conditions for conducting a search are essentially the same for all these reports, the search procedure is described below.

Wildcard characters allow multiple items to be selected in a single field. Where indicated on reports, the **?** and * wildcard characters can be used. In addition, most text entry fields support the use of wildcard characters, even though this may not be indicated on the report configuration display.

? will match any single character.

* will match any sequence of zero or more characters.

Note

- The **?** character must match exactly one character.
- The character "????????????????" (16 question mark characters) matches only those points whose names are exactly sixteen characters long. To match all points in your database, use "*". Some fields are blank for some records. A search on "*" will include these blank entries.
- To find only non-blank entries use "?*".

For Example, LC?? would only match point ID LC34 but would not match LC, LC2 or LC123. (Note that you can also use the * wildcard character to match any string of characters.)

Specifying Time Periods for Reporting

The Alarm/Event and Alarm Duration Reports and other similar reports all search the event file for required events during a specified time. For some of these reports, you must specify the start and end times for the report period. For others, you choose either a specific or a relative time period, and then enter the time span in the appropriate format. This section explains how to define these time spans.

Specific Time Period

To define a fixed time period for the report:

- Enter the start and end dates in the format DD-MMM-YY. For example, 02-Feb-97 for 2nd February 1997. (You can also use the numerical equivalent for a month. The system will automatically change your entry into a three-letter month abbreviation.) To specify the current date, leave the field blank.
- Enter the start and end times in the format HH:MM. For example, 10:24 for 10:24 am. (Note that some time fields allow you to enter seconds (SS) also.)

Relative Time Period

To define a time period relative to the time of requesting the report:

- Enter the number of hours and minutes prior to the present time in the **Length** field. For example, 1:30 means "from 1 hour and 30 minutes before the present time up to the present time".
- The time period cannot exceed 24 hours.

Controller Offline Time

If a controller has been offline, the field times of events might be different from the times allocated to the same events in PlantScape. To extend the time span of the search, and retrieve events whose times were affected by controllers being offline, enter the length of time that the controllers were offline in this field.

Modifying Report Configuration Details

If necessary, you can change report configuration details. For example, you can change the name of a report by typing in a new name in the **Title** field.

Note If you change the report type by making a new **Type** selection from the Definition tab, the report configuration details for the old report are erased.

Alarm and Event Reports

Every alarm or event that occurs is saved in the event file. The number of events that can be stored is determined by database sizing (refer to the installation guide for information on system sizing).

As this file becomes full, the oldest event is discarded whenever a new event is added. (For more details about alarms and events, see "Configuring Alarms for Points" on page 155.)

When Extended Event Archiving is licensed, the events are periodically transferred to the Online Extended Event file. By default, these reports search for data in the Online Extended Event file (instead of the Event file).

You can also configure the Alarm and Event report to retrieve data from the Archive (Playback) Extended Event file.

To configure an Alarm and Event report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Alarm and Event** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. Specify the types of alarms and events you want included in the report:

   Alarm or Event type

   Select the code for the alarm or event type you want included in the report. The types available are:

Code	*Description*
All	All alarms and events
Journal	Journal events only
Low	Low priority alarms only
High	High priority alarms only
Urgent	Urgent priority alarms only
Operator	Operator-initiated events

Table 13.1 Event Codes

For information about alarm priorities, see "Defining Events, Alarms, and Alarm Priorities" on page 162.

Event location

Use the **Event Location** list to specify whether the online event file is to be searched, or whether events should be retrieved from an event archive previously restored to the playback area.

Area

Enter an area code in the **Area** field if you only want to include alarms and events in a specific area.

Point ID(s)

Enter a specific point ID or use wildcard characters to search for a number of points. For details of wildcard characters, see "Using Wildcard Characters to Specify Report Data" on page 246.

Event description

You can either enter a specific event description or use wildcards to specify a number of event descriptions. For details of wildcard characters, see "Using Wildcard Characters to Specify Report Data" on page 246.

Subpriority

You can also specify the subpriority of the alarms you want included in the report. For information about alarm sub-priorities, see "Defining Events, Alarms, and Alarm Priorities" on page 162.

4 Under **Occurring during**, set your time period as described in "Specifying Time Periods for Reporting" on page 246

5 Under **Options**, enable or disable the **Print field time** check box as required.

Note **Print field time** is not supported on all controllers. Where supported, it is used to include in the report printout, the time that the event took place in the controller.

Alarm Duration Reports

Alarm Duration reports show the duration of alarms that occurred during a particular time period:

To configure an Alarm Duration report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Alarm Duration** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. Specify the types of alarms and events you want included in the report.

Area

Enter an area code in the **Area** field if you only want to include alarms and events in a specific area.

Point ID(s)

Enter a specific point ID or use wildcard characters to search for a number of points. (See "Using Wildcard Characters to Specify Report Data" on page 246.)

Alarm/Event description

Enter a specific event description or use wildcards to specify a number of event descriptions. (See "Using Wildcard Characters to Specify Report Data" on page 246.)

Alarm/Event type

Use the **Event type** list to select the code for the event type you want included in the report. The options are:

Code	*Description*
All	All alarms and events
Journal	Journal events only
Low	Low priority alarms only
High	High priority alarms only
Urgent	Urgent priority alarms only

Subpriority

You can specify the subpriority of the alarms you want included in the report. For information about alarm subpriorities, see “Defining Events, Alarms, and Alarm Priorities” on page 162.

Event Location

Select the location of the events to be searched for the report. The options are

Online, to search the online event file

Playback, to search an event archive that has been restored to the playback area.

4 Specify the time span for the report, as described in “Specifying Time Periods for Reporting” on page 246.

Cross Reference Reports

The Cross Reference Report can be used to find where points have been referenced in the server database. It can be used to list the following types of references for the nominated points:

- Custom displays (numbered displays, but not named displays)
- Trend sets
- Algorithms
- Reports
- Source address for another point
- Application program point lists

To configure a Cross Reference report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Cross Reference** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. In the **Point ID(s)** field enter the point ID you want to report on, or use wildcard characters to report on a number of points. (See "Using Wildcard Characters to Specify Report Data" on page 246.)
4. If you want the report to include points that are not implemented in the database, select the **Report on unimplemented points** check box. For example, you might report on unimplemented points if you need to check whether any displays are still referencing a point that you have deleted.
5. Select the **Use Previous Cross Reference file** check box to use the cross reference file generated the last time the Cross Reference Report was run.

   If there have been no changes to the database since the last time you ran this report, you can save time by selecting this option.

   If this option is not selected, the report examines the database and produces cross reference files which are then searched for the specified points.

Viewing Used Algorithm Blocks

Running the Cross Reference Report produces a file that lists used algorithm blocks. The file is called `algmap.rpt` and is located in the `server\report` folder. For example:

```
server\report\algmap.rpt
```

Viewing Cross Reference Errors

Any inconsistencies found in the database are recorded in the following file when the report is run. An error log is also generated at the end of the actual report file (`rptxxx.htm`):

```
server\report\xrferror
```

Downtime Analysis Reports

The Downtime Analysis Report can include delays that are still outstanding as well as those that have been resolved. The report output can also be sorted by downtime category and reason codes.

To configure a Downtime Analysis report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Downtime Duration** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. In the **Point ID(s)** field enter the point ID you want to include in the report or use wildcards to specify multiple points to include in the report. (See "Using Wildcard Characters to Specify Report Data" on page 246.)
4. Check the **Current Delays only** box if only outstanding delays should be included. Outstanding delays are those that have not yet been resolved and would therefore still be shown on the Downtime Summary display.
5. Specify the report sequence.

   The report can be sorted by a primary and a secondary sort key. The choices available are:

   - **NONE** (for no sorting)
   - **CATEGORY** (to sort data by downtime category)
   - **REASON** (to sort data by downtime reason code)
6. Under **Occurring in**, specify the time periods as described in "Specifying Time Periods for Reporting" on page 246.

History Archive

History Archive reports save point history to archives. They do not generate any printed output. History archives can also be configured using the History Archiving display. For details, see “Configuring History Archiving” on page 170.

Point Attribute Reports

Reports can be made of points with various attributes.

To configure a Point Attribute report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Point Attribute** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. In the **Point ID(s)** field, enter the point ID you want to report on or use wildcard characters to search for a number of points. (See "Using Wildcard Characters to Specify Report Data" on page 246.)
4. Use the **Attribute** list to enter the appropriate code for the point attribute to be reported on. The available attributes are described in the next table.

Attribute	*Description*
Off-Scan	Reports on points that are "off-scan," that is, points for which scanning is disabled
Alarm Inh	Reports on points for which alarming is inhibited
Bad PV	Reports on points whose PV value is bad
Manual MD	Reports on points in manual mode
State	Reports on status points in a particular state
Value	Reports on current point values, including PV, current alarm(s), OP, and MD
Alarm Attr	Reports on alarm configuration settings

Table 13.2 Point Attribute Codes

5. If you are configuring this report for the first time you must enter your descriptor choices such as **`Open`**, **`Alarm`**, **`Close`** and **`Normal`** and so on in the **State Descriptor Choices** fields.

   A descriptor can be up to eight characters. If you enter a longer descriptor, it is truncated.
6. After descriptors have been configured in the **State Descriptor Choices** fields, you can choose one of these descriptors from the **State List** on which to build a report.

Sequence of Events Reports

Some types of controllers, such as the TDC 3000 PIU, have the capability to time-stamp events to millisecond resolution. When this capability is used, the server stores the high resolution event information in the server "sequence of events" file. You can configure the Sequence of Events report to list events from this server file for selected points during a selected time span.

To configure a Sequence of Events (SOE) report:

1. Click the Definition tab (see "Configuring a New Report" on page 243), select **Sequence of Events** from the **Type** selection list, and enter the report definition details.
2. Click the **Content** tab.
3. In the **Point ID(s)** field, enter the point ID you want to report on or use the wildcard characters to specify multiples points to be included in the report. (See "Using Wildcard Characters to Specify Report Data" on page 246.)
4. Specify a time period as described in "Specifying Time Periods for Reporting" on page 246.

Batch Reports

Batch reports are used to collect history for a set of points and events for an area for the duration of a production run.

A batch report can collect:

- One type of history sample (such as 5-second samples or 1-hour averages) for up to 50 points
- Events for one area

Notes

- Each point included in a batch report must be configured to collect the type of history required by the report. For example, if the report requires 1-hour averages, each point must configured to collect Standard history, which includes 1-hour averages.
- A batch report can collect up to 65000 history samples.
- Once started, a batch report continues to run until it is stopped. See "Starting and Stopping a Batch Report" on page 263.
- A batch report generates a set of four files:
  - A text file that contains the history and event data
  - A Microsoft Excel file that contains the history and event data
  - A comma-delimited (csv) file that contains the history data
  - A comma-delimited (csv) file that contains the event data
- Batch reports are started/stopped by using LRN 178. See "Starting and Stopping a Batch Report" on page 263.
- Batch report files are stored in `Server\Report\Batch`, with their read-only attribute set. The filenames are as specified in "Batch Report Filenames" on page 261.

To configure a batch report:

1 Click the Definition tab (see "Configuring a New Report" on page 243), select **Batch Report** from the **Type** selection list, and enter the report definition details.

2 Click the **Content** tab and configure the details as appropriate.

Property/Button	*Description*
Batch identifier	A user-defined property (such as a batch) that forms part of the report filenames each time the report is run. 20 characters maximum. (Because it forms part of a filename, it must not contain characters such as *, ?, \, | and /.) "Batch Report Filenames" on page 261 describes how report filenames are generated.
Lot identifier	A user-defined property (such as a lot) that forms part of the report filenames each time the report is run. 20 characters maximum. (Because it forms part of a filename, it must not contain characters such as *, ?, \, | and /.)
Size of production run	An information-only property that is included in the report's header. An integer.
Number of pieces in run	An information-only property that is included in the report's header. An integer.
Employee identifier	An information-only property that is included in the report's header. 20 characters maximum.
Batch description	An information-only property that is included in the report's header. 80 characters per line.
Product re-run	Specifies whether the last batch run needs to be re-run. If set to `Yes`, the **Last sequence num** value is re-used, and a re-run counter is used (which is incremented each time the Lot is run). The Re-run number forms part of the report filenames each time the report is run. If set to `No`, the re-run number is set to `0`.
Historical point list	The name of the points list used by this report. (The list specifies the points/parameters whose history is included in the report.) To define the list, click **Define Point Lists**. See "Creating a Points List" on page 261.
History type	The type of point history that is included in the report.
Events area	The area for which events are recorded by the report.
Generate Excel file	When checked (the default), a Microsoft Excel Batch report (xls file) is generated. If you deselect the option the text and comma-delimited files are still generated.

Property/Button	*Description*
Status	Shows the current status of the report, which can be: • `Ready` - the report is not running. • `Working` - the report is running. • `Finishing` - a complete batch report is being generated. • `Error` - the report has stopped because of an error.
Start time	The time/date when the report started.
End time	The time/date when the report competed. If **Status** is set to `Working`, **End time** is replaced by **Duration**.
Duration	Only visible if the report is running. The length of time in days, hours, minutes and seconds that the current report has been running.
Current sequence num, or Last sequence num	**Current sequence number** is only displayed if the report is running. Indicates the sequence number that is currently being used. **Last sequence number** is only displayed if the report is not running. Indicates the sequence number that was used the last time the report was run.
Request	Calls up the report. If the report is running, the data available from the time the report started to the time of the request is displayed. If the report is not running, the last report that was run is displayed. If you want to start the report, see "Starting and Stopping a Batch Report" on page 263.
Reset sequence num	Sets the value of **Last/Current sequence num** to `0`.
Batch Report Filename	The report's filename. If **Product Re-run** is set to `Yes`, the incremental re-run number is used. If the report is being run, the next partial report number is used.

Creating a Points List

You use the Application Point List to define the set of points used in a batch report.

Note that every point on the list must be configured to collect the type of history required by the report. For example, if the report requires 1-hour averages, each point must configured to collect Standard history, which includes 1-hour averages.

To create a point list:

1. Select **Configure ⇒ Application Development ⇒ Application Point Lists** to call up the Applications display.
2. Click an empty row to call up the Application Point List display.
3. Give the list an appropriate name, and add each point/parameter that you want to include in the batch report.

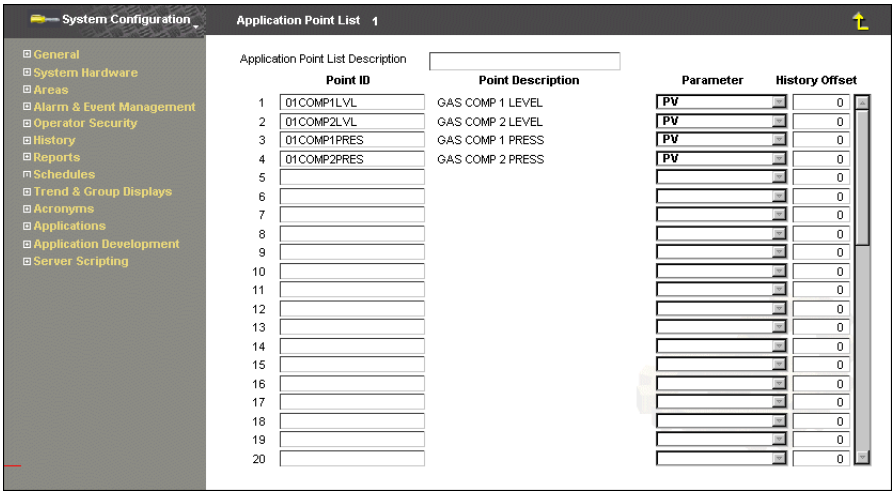


Figure 13.1 Typical Application Point List

Batch Report Filenames

The filename of batch reports are defined as follow:

`Rpt`*`nnn`*`-b`*`BatchId`*`-l`*`LotId`*`-s`*`SeqNo`*`-r`*`ReRun`*`-p`*`Partial`*`.ext`

Part	*Description*
nnn	The report number, as shown in the Reports display.
BatchId	The Batch identifier specified for the report.
LotId	The Lot identifier specified for the report.
SeqNo	The report's sequence number, which contains three digits with leading zeros. (Corresponds to the Last/Current sequence num on the Definition tab for the report.)
ReRun	The report's re-run number, which contains 2 digits with leading zero.
Partial	The report's partial report number, which is incremented each time a report is requested while it is being run. Two digits with leading zeros. After the report has finished running, the number reverts to `00`, and all partial reports from the same run are removed.
ext	Each report generates four files, which have the following extensions and contents: • `txt` - plain text • `hst.csv` - CSV file containing history data • `evt.csv` - CSV file containing event data • `xls` - Excel file containing the history and event data

Example This example shows the four files that are created in `Server\Report\Batch` after a report has been run.

```
rpt001-bA1N0458-l105-s005-r00-p00.txt
rpt001-bA1N0458-l105-s005-r00-p00.hst.csv
rpt001-bA1N0458-l105-s005-r00-p00.evt.csv
rpt001-bA1N0458-l105-s005-r00-p00.xls
```

The `Server\Report` folder also contains a copy of the text version (txt) of the report.

Starting and Stopping a Batch Report

You use LRN 178 to start and stop the collection of data for a batch report. You can invoke LRN 178 in a number of ways, for example by requesting it via pushbutton to a custom display, or by invoking it in a script or via action algorithm 71 (Queued Task Request).

This LRN uses the following parameters.

Parameter	
1	The number of the batch report for which you want to start/stop collecting data.
2	Specifies the required action, depending on its value: 1 = Starts the collection of data for the report. 2 = Stops the collection of data for the report and outputs the report. 3 = Stops the collection of data for the report, but doesn't output the report.

ODBC Data Exchange Reports

The ODBC Data Exchange option enables you to configure the two-way exchange of data between the server database and an ODBC-compliant third-party database, using standard Structured Query Language (SQL) commands. This feature is available if your server license includes ODBC Data Exchange.

After the system is configured to include the ODBC Exchange option, you can use Station to configure report details in the same way as you configure pre-formatted reports. For complete information on how to configure an ODBC Exchange prior to reporting, see "Configuring the PlantScape ODBC Driver" on page 394.

To configure an ODBC Data Exchange report on Station:

1. Configure the report definition, with Report type set to **ODBC Data Exchange** (see "Configuring Definition Details" on page 243).
2. When definition details are complete, click the **Content** tab. For information on what you can specify, see "Configuring the ODBC Data Exchange Report" on page 418.

Microsoft Excel Reports

With Microsoft Excel Reports you can:

- Get values from point parameters
- Perform calculations on those points
- Retrieve historical data to determine summations, maximums, minimums, and standard deviations
- Retrieve alarms and events
- Generate graphs and tables
- Store new values or calculations in the server database, provided you installed Microsoft Excel Data Exchange with the "write" option enabled.

Microsoft Excel reports enable you to design a custom report in Microsoft Excel, which is configured and run from Station like other PlantScape reports. You can use Microsoft Excel Data Exchange or the PlantScape ODBC Driver to access data in the server database from Microsoft Excel. Refer to "Using PlantScape Data in Other Applications" on page 391 for further information on these. When the report runs this data is refreshed and a copy of the data is saved.

Note If you create a new spreadsheet for Integrated Microsoft Excel Reports prompts and error messages are not visible in Station. You need to open the new spreadsheet in Microsoft Excel using the **mngr** account before running the report in Station.

Choosing between Microsoft Excel Data Exchange and ODBC

Microsoft Excel Data Exchange is a licensable option for PlantScape, and the PlantScape ODBC driver is standard. Points to consider when choosing between Microsoft Excel Data Exchange and the ODBC Driver are:

They have different installation requirements (for details, see the *Installation Guide*).

- Microsoft Excel Data Exchange can access all information in the server database, the ODBC Driver can only access point, history, event, and some access control data.
- Microsoft Excel Data Exchange can write to the server database.
- The ODBC Driver follows the same security conventions as other reports, while Microsoft Excel Data Exchange has no security.

Creating Custom Reports with Excel

To create a Microsoft Excel report you need to:

- Create a report definition file to define the data that the report will contain.
- Configure the report on Station to specify when and how your report will be run.

Creating the Report Definition File

A report definition file is an Microsoft Excel File that is set up to access and process data from the server database. There are two ways to access data in the server database–through Microsoft Excel Data Exchange or the PlantScape ODBC Driver.

Inserting Server Data into Your Report

Data you can access using Microsoft Excel Reports includes:

- Point parameter values and history data
- Alarms and events
- Other data in any server or system files

To insert server data into your report, set up either Microsoft Excel Data Exchange functions or ODBC queries that access the server database. You can then set up calculations and graphs that use the data in your report file.

When the report is run:

- All functions and queries contained within the report definition file are executed, updating the data in the report.
- Any calculations or graphs in the report are refreshed
- The data in the report definition file is saved as a Microsoft Excel file in the PlantScape report folder. All links, formulas, and ODBC queries are removed in the report output–it becomes a snapshot of the data in the file at the time the report was requested. This prevents report data from being subsequently refreshed. The report file is named `rptnnn.xls`, where `nnn` is the number of the report. A `rptnnn.htm` file is also generated, to enable viewing of the report from Station.
- The report can be printed. Printing uses the printer settings configured on Microsoft Excel and sent to the printer configured on Station.

Refer to "Using PlantScape Data in Other Applications" on page 391 for details of the data you can access via Microsoft Excel Data Exchange or the ODBC Driver and how to access it.

Note Do not create a report that will require users to respond to a prompt. Microsoft Excel is not visible when the report is run. If the report requires a response it will either hang or fail.

Before you make a spreadsheet available as an integrated Excel report, open it at least once with **mngr** level security. As **mngr** you can see Excel messages and prompts that are not visible at other security levels.

Saving the Report Definition File

Save the report definition file in a folder which is visible from the server. This may be over a network.

On redundant server systems the report definition file must be saved in the same folder on both servers (For example, `Server\user`). To automatically back up the definition, add the folder containing the files to the file `flkbup.def`, located in the data folder. Refer to "Synchronizing Other Files" on page 324 for details on using `flkbup.def` to transfer non-database files to the backup.

Security Issues

There are two ways for an Microsoft Excel Report to access data from the database: via Microsoft Excel Data Exchange, or via the PlantScape ODBC driver.

The security of data fetched via the ODBC driver will depend on the type of report.

- For reports requested on Stations with Operator Based Security, the ODBC Driver uses the access capacity of the requesting operator.
- For reports requested on Stations without Operator Based Security on the ODBC Driver uses Station security.
- For Periodic reports there is no security.

If a report requests data that is not accessible to the requesting operator or Station then the ODBC Driver will not return the data.

Microsoft Excel Data Exchange, in conjunction with a Microsoft Excel Reporting, provides no operator authentication or other security measure. It is recommended that Microsoft Excel Data Exchange be installed with ***`read-only`*** capacity.

Configuring the Report Details

Microsoft Excel reports, like other PlantScape reports, need to be configured on Station. This is done on the Microsoft Excel Report Configuration display.

To configure an Microsoft Excel report:

1. Click the Definition tab (see "Configuring a New Report" on page 243) and enter the report definition details.
2. Select Microsoft Excel from the **Type** selection list.
3. Click the **Content** tab.
4. Fill in the **Definition File** field with the full path name of the report definition file.

Example Using Microsoft Excel reports with Microsoft Excel Data Exchange.

This example leads you through the steps involved in producing an Microsoft Excel report which uses Microsoft Excel Data Exchange to access the server database. It assumes that you have already completed the installation of your PlantScape system. In particular that you have:

- Installed Microsoft Excel and Microsoft Query on the server.
- Enabled Microsoft Excel Data Exchange on the server using the Windows `mngr` account (see "Enabling Microsoft Excel Data Exchange under Different User Accounts" on page 457).
- Disabled the **Ask to update automatic links** prompt on Microsoft Excel.

This report retrieves the last 20 history values of a system sinewave point. Before continuing, configure a system sinewave point, called *sinewave*, and assign it to fast history. For details on how to do this see "Using PlantScape ODBC Driver and Microsoft Access" on page 408.

Creating the Report Definition File

To create a report definition file which retrieves the last 20 fast history values of the point ID "sinewave".

1. Log in using the `mngr` user account.
2. Start Microsoft Excel.
3. Choose **Tools** ⇒ **Microsoft Excel Data Exchange** ⇒ **Wizard**.
4. Select **Get history values from server(s)** and click **Next**.
5. Fill in the fields as follows:
   - **Server**: `localhost`
   - **Point ID**: `sinewave`

– **Point parameter**: `pv`

6 Click **Add**, then **Next** to display the next step.

7 Fill in the fields as follows:

– **history type**: `Fast History Snapshots`

– **number of values**: `20`

– **offset**: `1`

– **Arrange data**: `vertically`

– for all other fields accept the default.

8 Click **Finish** to display the result.

9 To include the date-time at the which the report is run, select an empty cell and type `Now()`.

Saving the Report Definition File

1 In Microsoft Excel go to **File ⇒ Save As**.

2 Browse to the `server\user` folder and enter `sinewave` as the filename.

3 Click **OK** and Exit Microsoft Excel.

Configuring the Report on Station

Note If you have a report definition file that was created by a user account other than `mngr`, you need to:

a) Ensure you are logged on to Windows as **mngr**.

b) Open the workbook in Microsoft Excel.

c) Click **Tools ⇒ Microsoft Excel Data Exchange ⇒ Update Formulas in Workbook**.

d) Save the workbook.

1 Start Station and log in at mngr security level.

2 Go to **Configure ⇒ Reports**. This opens the Reports display (see "Configuring Reports" on page 242).

3 Go to an unassigned report row and click the **Configure** button.

4 In the Definition tab, complete the following:

– add a title and a name

– select Microsoft Excel from the **Report type** list.

– enable reporting on request

5 Click the **Content** tab.

6 Enter the full path to the file, sinewave.xls, saved above. For example, `C:\server\user\sinewave.xls.`

Configuring Free Format Reports

This section provides overview information about the Free Format Report. It shows how you use Station to configure a custom report and describes the components of a Report Definition file.

For detailed information about the structure of a Report Definition file and the variables used, refer to “Free Format Report Reference” on page 272.

Free Format Reports

Free format reports are only available with the Free Format Report Writer option.

You can use the Free Format Report Writer option to create and format customized reports. These custom reports can include information from calculated values as well as data extracted from the server database.

Free Format reports can also be used to write information back to the server database, and can be used instead of application software for simple applications.

If you are using the Free Format Report Writer option, you can create custom reports that:

- Get values from point parameters
- Perform calculations on those values (for example, addition, subtraction, multiplication, division, and exponentiation)
- Retrieve historical data to determine summations, maximums, minimums, and standard deviations
- Generate an X-Y plot of the historical values for two points
- Store new values or calculations in the server database or in operating system files

Creating a Report Definition File

To create a report definition file, you can use any text editor supported by Windows.

When a Free Format report is run, the report definition file is read and a report based on the contents and format defined in this file is generated.

For details of the structure, contents and variables of Free Format Report definition files, refer to “Free Format Report Reference” on page 272.

Saving Report Definition Files

Report definition files can be given any name, and should be saved in the following path:

```
server\user
```

Configuring the Report Details

After creating the definition for the Free Format Report, you need to configure it via the Reports display on a Station just like any other PlantScape report.

To configure a Free Format report:

1. Click the Definition tab (see "Configuring a New Report" on page 243) and enter the report definition details.
2. Select **Free Format** from the **Type** selection list.
3. Click the **Content** tab.
4. Type the path and file name in the **Definition File Path** field.

   For detail on creating a Definition File, see "Structure of a Report Definition File" on page 272.

Tip *If the data in your report does not fit within the width of a portrait page, change the page orientation to landscape. Log on to Windows using the Windows mngr account and change the orientation in the Windows Printing Preferences to landscape.*

Free Format Report Reference

This section gives details about the structure and contents of a Free Format Report. It contains:

- Information about the structure of a Free Format Report definition file and how it should be stored
- A description of report variables by function
- An alphabetical listing and detailed description of variables
- An example of a Free Format Report definition file and its output

Structure of a Report Definition File

To create a report definition file, you can use any text editor supported by Windows.

A report definition file is a text file that is made up of two sections:

Variable definition	This section defines the variables and gives them values that will be used in the report.
Formatting	This section defines how the data that is generated via the variable definition section is to be presented in the report output.

When a Free Format report is run, it reads the report definition file and produces a report based on the entries in this file.

Variable Definition Section

There are 14 different types of entries you can use in creating variable definitions. Entries consist of one line starting with either:

- An alphabetic character representing a variable definition (instruction), or
- An asterisk representing a comment line.

The different types of variable definition entries and their parameters are listed in “Variable Definitions by Functions” on page 273.

Within a variable definition line:

- The fields must be space or tab-separated.
- Index numbers can be used to identify variables.

A variable is one item of information (such as a temperature) stored in a point parameter. A variable can contain:

- Point values (including historical data)
- Values from server database files and regular operating system files
- Calculated values

You can include up to 999 variables in a definition file. Of these variables, a maximum of 400 can be character variables (ASCII).

Example The following lines are an excerpt from a variable definition file, showing a comment line and a variable definition entry:

```
*   Get the Point ID
F   1 01IT1LEVEL NAME   A10
```

In this example, the variable definition line represents an instruction to:

> "F(etch) the value of the point whose ID is 01IT1LEVEL and whose parameter is NAME and store the value in index 1, using an ASCII 10-character format."

Formatting Section

The formatting section follows the variable definition section. This section refers to the variables you defined in the variable definition section.

The layout for the report output is specified in a WYSIWYG (what-you-see-is-what-you-get) format. This includes headings, outlines and spacing.

Free format reports can be a maximum of 132 columns wide.

Detailed information about formatting options is given in "Formatting the Report Output" on page 276 and in "B (Start of Report Body)" on page 279.

Saving Report Definition Files

Report definition files should be saved in the `server\user` folder or a folder under it. The file can be given any name.

Variable Definitions by Functions

This section groups Free Format Report variables according to the type of function they perform. For a detailed description of each variable and some examples, refer to "Free Format Variables Reference" on page 277.

Using Point Values

The most common values used in custom reports are point values.

Reading a Point Parameter from the Server Database

Three report definition file entries are provided for reading and writing points values:

F = Fetch from point	Reads a specified point parameter into a Free Format variable. The format to be used when the variable is printed in the report can be specified. When reading history parameters, it is also possible to read multiple history values into successive Free Format variables at once by specifying an offset into the history file and the number of history samples.
A = Acquire field value	Is identical to "fetch from point" except that the point parameter is scanned from the field before reading the value. This entry is used to obtain an up-to-date field value if required.
X = Demand point processing	Is identical to "acquire field value" except that processing of the point is forced regardless of whether or not the point value has changed. This entry is used to force any algorithms attached to the point to be to executed.

Storing Values in Point Parameters

There is one entry for storing values in the point parameters:

G="Give to Point"	Stores a value in a Free Format variable in the specified point parameter.

Performing Calculations

Two entries are provided so that calculations can be performed with Free Format variables:

C = Calculated Variable Definition	Used to specify the print format to be used for the Free Format variable that is the result of the calculation.
P = Perform Calculation	Used to specify the expression for a calculation on several Free Format variables. Addition, subtraction, multiplication, division and exponentiation operations can be performed.

Working with Historical Data

In addition to the entries provided for reading history data for points (see "Using Point Values" on page 274), Free Format entries are provided for history data calculations:

T =Totalize history	Enables history values for a point to be read from the database and totalized. The total is stored in the specified Free Format variable. The format used when the variable is printed in the report can be specified.
L = History maximum/minimum	Enables the maximum and minimum history values for a point to be determined and stored into two successive Free Format variables.
D = History standard deviation	Enables the standard deviation to be determined for history values for a point and then stored in a Free Format variable.

Using Server Database and Operating System File Values

The server database consists of a number of files including "user files" that are provided for use by application programs. (For details about the server database and user files, see the application development guide.)

Free Format report entries are provided to read values from and write values to server database files. Values can also be read from operating system files.

M = Operating system file definition	Provided to specify the details about an operating system file to be accessed. It enables the record size and path name of the file to be specified.

R = Read from file	Provided to read a value from a server database file or operating system file into a Free Format report variable. To read from an operating system file the file must first be defined with the entry, M, Operating system file definition.
W = Write to file	Provided to write a value from a Free Format report variable into a server database file.

Formatting the Report Output

B = Start of report body	Used at the end of the variable definition section to indicate the start of the formatting section of the report. Any lines following this entry will be included in the report output. They are used to specify the layout of the report including headings and spacing.

Specify any sections of the report output that are to contain values from Free Format report variables by enclosing the variable index number in single quotation marks.

Special characters can be added for spacing lines and forcing page breaks.

Lines can be repeated. Free Format variable index numbers can be incremented within repeated lines.

An operating system text file can be copied directly into the report. To include an operating system file, first define the file with the 'Operating System File Definition' entry in the variable definition section.

An X-Y plot of history samples for a point can be plotted. The history samples need to have been previously read from the database using the 'F = Fetch from point' entry in the variable definition section.

Free Format Variables Reference

This section contains details about each of the Free Format Report Definition file entries.

- A (Acquired Field Value)
- B (Start of Report Body)
- C (Calculated Variable Definition)
- D (History Standard Deviation)
- F (Fetch From Point)
- G (Give to Point)
- L (History Maximum and Minimum)
- M (Operating System File Definition)
- P (Perform Calculation)
- R (Read From File)
- T (Totalize History)
- W (Write to File)
- X (Demand Point Processing)

Free Format Report Example

A (Acquired Field Value)

Purpose

Scans a point parameter value before storing it in a Free Format variable. Otherwise this entry is identical to the F (Fetch from point) entry.

Format

```
A  Index  Point_ID  Parameter  Print_Format
```

Description

Index

Number (1-999) identifying report variable to store value acquired from field.

Point_ID

Point name

Parameter

As described for entry type F. History parameters are not enabled.

Print_Format

As described for entry type F.

See Also:

Entries F, G, and X

B (Start of Report Body)

Format

```
B
```

Description

This entry is the last in the variable definition section. Lines that follow this entry specify report layout, including: headings, outlines and spacing.

Areas to contain variable information are identified by single quotation marks enclosing the index number of the Free Format variable. The width of the field that will print equals the number of characters entered between (and including) the quotation marks. It is not dependent on the format specified in the 'Print_Format' entry. For example, if the value 13645.23 is stored at index 7 and you enter '_7___' (only four additional spaces for a total 7 character width) for the variable, an error will result. The field will be filled with "*"s.

Errors in a field (for example, "bad" values; "Point does not exist" and so on), will cause a single asterisk (*) to be printed immediately after the field, "..."*. For this reason, it is recommended to leave a space following each field to accommodate possible error conditions.

Lines are single-spaced unless spacing characters are found in column 1.

: leave 1 blank line

/ skip to head of next page

Lines can be repeated in the following way, starting in column 1.

```
$$RRII...
```

where:

`$$`
: Shows repeat requested

`RR`
: Is the number of times a line must be repeated. Can be an index I$$RRII.

`II`
: Is the index increment for each line

`...`
: Is the layout of the line

An operating system file can be copied into the body of the report using the following command, starting in column 1.

```
$Cnnn
```

where:

`nnn`
: Is the index number (501-599) of a user defined sequential file previously defined using the M entry

An X-Y plot of two arrays of values can be output in the body of the report using the following command, starting in column 1.

```
$XY Xindex Yindex   Num    Xmin   Xmax   Ymin   Ymax
```

where:

`Xindex`
: The first element in array for x axis variable.

`Yindex`
: The first element in array for y axis variable

`Num`
: The number of samples to plot

`Xmin`
: x axis minimum

`Xmax`
: x axis maximum

`Ymin`
: y axis minimum

`Ymax`
: y axis maximum

Note Points with co-ordinates equal to the x axis minimum or maximum will not be plotted.

C (Calculated Variable Definition)

Purpose

Specifies the print format for the Free Format variable containing the result of a calculation. This entry is always used together with the P (Perform calculation) entry and may come before or after it.

Format

```
C  Index  Print_Format
```

Description

Index

Number (1-999) identifying report variable to store result of calculation.

Print_Format

As described for entry type F.

See Also:

Entry P.

D (History Standard Deviation)

Purpose

Used to calculate the standard deviation of history values of a point and to store the standard deviation in a Free Format variable.

Format

```
D Index Point_ID Parameter Print_Format [History
Type(Offset) Repeat]
```

Description

Index

The number (1-999) identifying report variable to store standard deviation.

Point_ID

Point name of the analog point.

Parameter

As described for entry type F. Only history parameters are permitted.

Print_Format

As described for entry type F.

[History Type],[*Offset*],[*Repeat*]

As described for entry type F.

Example

```
D   2 SINEWAVE    PV    F8.2     H6M(10)     5
```

In the above example, five values of "6 minute history" for Point SINEWAVE (offset 14 to offset 10) are retrieved. The standard deviation of these values is stored in Index 2 and printed as a floating point number.

See Also:

Entries L and T.

F (Fetch From Point)

Purpose

Reads a point parameter value and stores it in a Free Format variable. Multiple point history values can be read into successive free format variables.

Format

```
F Index Point_ID Parameter Print_Format [History Type
(Offset) Repeat]
```

Description

Index

The number (1-999) identifying the start of the report variable in which to store the history value fetched. The first value fetched is the most recent history value.

Point_ID

The point name.

Parameter

Any valid parameter name can be entered. Control Processor Module parameters can be entered in the form <block>.<parameter>. For example, PIDA.PV.

The names of commonly used point parameters are:

Parameter	ANA	STA	ACC
PV Process Variable	x	x	x
MD Mode	x	x	
OP Output	x	x	
SP Set Point	x		
A1 Auxiliary 1	x		
A2 Auxiliary 2	x		
A3 Auxiliary 3	x		
A4 Auxiliary 4	x		

Parameter	ANA	STA	ACC
EULO 0% Range	x	x	
EUHI 100% Range	x	x	

(For a list of standard point parameters, see "Summary of Point Parameters and Addresses" on page 133.)

`Print_Format`

"FORTRAN" style format descriptors:

In	Integer
Zn	Short integer in hexadecimal notation
Fn.m	Floating point
En.m	Floating point in exponential form
An	ASCII
D	Date (DD-MMM-YY) integer date is in minutes
T	Time (HH:MM:SS) real data is in seconds

where:

n	Is the width of the field and m is the number of decimal places.

When accessing status points, the PV or OP can be expressed as a state descriptor by specifying the print format as:

```
Sn     State descriptor of length n characters.
```

`[History Type]`

Can be one of:

H1M	History Standard 1 minute snapshot
H6M	History Standard 6 minute snapshot
H1H	History Standard 1 hour average

H8H	History Standard 8 hour average
H24H	History Standard 24 hour average
H5SF	History Fast snapshot
H1HE	History Extended 1 hour snapshot
H8HE	History Extended 8 hour snapshot
H24HE	History Extended 24 hour snapshot

[*Offset*]

This is the offset within the history file. It locates the required value in the history file. For example:

(1) Start from most recent value

(10) Start from 10th most recent value

An index number may be used as the offset, for example, "$2".

[*Repeat*]

This number of history values will be retrieved starting from the offset and going back in time. An index number may be used in the Repeat, for example, "$3".

Note

- The Offset and Repeat fields are only required for history parameters (for example, H1M). They should be left blank if a non-history parameter (for example, PV) is specified.
- Entry type F assigns index numbers to the fetched history values by incrementing from the index number specified. For details, see Example 1 below.

Examples

Example 1:

```
F   2 FIC123    PV    F8.2    H6M(10)    3
```

In this example, "6 minute history" is required. The starting index is 2. The offset is 10 and the repeat value is 3. The history values are reported in floating point format.

Therefore:

The 10th most recent value will be index no 2.
The 11th most recent value will be index no 3.
The 12th most recent value will be index no 4.

Example 2:

```
F   6 FIC123    PV      D6     H6M(10)    3
```

In this example, the date of the history values retrieved in Example 1 will be obtained. They will be stored in indexes 6, 7 and 8. The format of the date will be DD-MMM.

Example 3:

```
F   5 FIC123    PV       F8.2
```

In this example, the value of the PV of point FIC123 is fetched from the database and stored in Index number 5.

Example 4:

```
F  20 FIC123    PV     F8.2    H6M($10)  3
```

In this example, the value stored in index 10 is used as the history offset.

Example 5:

```
F  20 FIC123 PIDA.PV F8.3  H1M(1) 10
```

In this example the last 10 samples of 1 minute standard history for the parameter PIDA.PV of point FIC123 are fetched.

See Also:

Entries A, G, and X.

G (Give to Point)

Purpose

Stores the value in a Free Format variable in a point parameter. A control will be performed for point parameters with destination addresses.

Format

```
G  Index   Point_ID   Parameter
```

Description

Index

The variable containing the value to be stored; this variable must have previously been initialized.

Point_ID and *Parameter*

As described for entry type F. History parameters are not supported.

See Also:

Entries A, F, and X.

L (History Maximum and Minimum)

Purpose

The maximum and minimum history values of a point are stored in two successive free format variables.

Format

```
L Index Point_ID Parameter Print_Format [History
Type(Offset)Repeat]
```

Description

Index

The number (1-999) identifying the report variable to store the total.

Point_ID

The point name of the analog point.

Parameter

As described for entry type F.

Print_Format

As described for entry type F.

[History Type],[*Offset*],[*Repeat*]

As described for entry type F.

Example

```
L   2 SINEWAVE PV  F8.2  H6M(10)  5
```

In this example, 5 values of "6-minute history" for point SINEWAVE (offset 10 to offset 14) are retrieved. The maximum and minimum values are stored in Index 2 and 3 respectively and printed as floating point numbers.

See Also:

Entries T and D.

M (Operating System File Definition)

Purpose

Defines the details about an operating system file to be accessed by the R (Read from file) or W (Write to file) entries.

Format

```
M  Type No Rec_sz Path
```

Description

Type

SEQ for sequential file and REL for relative file. Should always be SEQ for Windows 2000.

No

Internal file number (501-599) used for file identification within the Free-Format report.

Rec_sz

Record size in bytes.

Path

File name (and path) for example, `server\user\dlyacc.dta`. If a new file is to be used, it must first be created.

Note

- If the file is to be accessed by a FORTRAN program using standard READ/WRITE then the first element of data is stored at word offset three (if the file is relative).
- A sequential file (xxx) is copied onto a scratch file (xxx.REL) for READ/WRITE. Therefore a file with this name must not already exist.
- The length of the name of a sequential file should be four characters less than that of the longest file name.

See Also:

Entries R and W.

P (Perform Calculation)

Purpose

Specifies a calculation to be performed. The result of the calculation is stored in a free format variable. This entry is always used together with the C (Calculated Variable Definition) entry and may come before or after it.

Format

```
P Index Expression
```

Description

Index

The number (1-999) identifying report variable to store result of calculation.

Expression

Free-Format expression
The expression can be composed of index numbers, (denoted by a "$" meta-character), constants, and any combination of the operators:

- `+` add
- `-` subtract
- `/` divide
- `*` multiply
- `^` exponentiate
- `=` equate
- `()` brackets

Example

```
P 22 = $27+$99*0.75/($32+5)
```

Where:

$27, $99 and $32 are index numbers 27, 99 and 32 respectively.

Note

- The expression is terminated with a blank (space) or a ":" character. A maximum of 10 operations may be performed on one line.
- Calculations are done to the highest precision and rounded to the desired print format. This can result in the following situation:

```
              123.0
              123.0
TOTAL         246.1
```

R (Read From File)

Purpose

Used to read a value from either an operating system file or a server database file. If the value is to be read from an operating system file the M entry should be used to define the details about the file.

Format

R *Index No Rec_No Offset Print_Format Type* [*Read*]

Description

Index

Number (1-999) identifying variable to store value read from file.

No

File number 1 - 500 for server file;
501 - 599 for operating system defined files.

Rec_No

Record number within file.

Offset

Word offset within record for relative files,
character offset for sequential files.

Print_Format

As described for entry type F, except S format.

Type

Data type in record

RL	for Real
1	for Integer
I2	for integer*2
I4	for Integer*4
Ib.w	for bit field: b=bit, w=width
DP	for Double Precision
An	for ASCII: n=length of string

[*Read*]

Optional. This specifies the format to be read from the specified sequential file. If omitted, the value read is unformatted and has the same representation as it does in memory.

In	**Integer**
Zn	Short integer in hexadecimal notation
Fn.m	Floating point
En.m	Floating point in exponential form
An	ASCII
D	Date (DD-MMM-YY) integer date is in minutes
T	Time (HH:MM:SS) real data is in seconds

where:

n	Is the width of the field and m is the number of decimal places.

Examples

Example 1:

```
R  26 00031 $25   00001 F8.2   RL
```

The value stored in Index number 25 will be used as the record number. If the file numbered 31 is sequential, the read will be assumed to be unformatted.

Example 2:

```
R  74 00503 00043 00027 Z4     I     I5
```

The file numbered 503 is sequential. If line 43 of the file is:

```
            2   2   3   3
            0   5   0   5
data:       4567890012345678
```

Then the value of index number 74 will be 1,234 and on the report will appear as 04D2 (hex).

Example 3:

```
R 011 00502 00003 00005 I6     I4
```

File numbered 502 is sequential. If record 3 contains 0001 (hex) and 8001 (hex) in its fifth and sixth word, then the value of Index number 11 will be 98,305.

Note No, Rec_No, and Offset can all be indirect by using the "$" operator (for example, Rec_No = $123 means use the value of index number 123).

See Also:

Entries M and W.

T (Totalize History)

Purpose

Totals the history values for a point and stores the total in a free format variable.

Format

```
T Index Point_ID Parameter Print_Format [History Type
(Offset)Repeat]
```

Description

Index

Number (1-999) identifying report variable to store total.

Point_ID

Point name of the analog point.

Parameter

As described for entry type F.

Print_Format

As described for entry type F.

[History Type],[*Offset*],[*Repeat*]

As described for entry type F.

Example

```
T 2  SINEWAVE    PV    F8.2    H6M(10)    5
```

In this example, five values of "6 minute history" for Point SINEWAVE with offset 10 are summed and stored in Index 2. The sum is printed as a floating point number.

See Also:

Entries L and D.

W (Write to File)

Purpose

Used to write a value from a free format variable to either an operating system file or a server database file. If an operating system file is to be accessed, then the details about the file should be specified with the M entry.

Format

```
W Index No Rec_No Offset Type [Write]
```

Description

Index

Number (1 - 999) identifying the database variable storing the value to be written.

No

File Number 1 - 500 for server file;
501 - 599 for operating system defined files.

Rec_No

Record number within file

Offset

Word offset within record for relative files,
character offset for sequential files.

Type

Data type in record

RL for Real
I for Integer
I2 for integer*2
I4 for Integer*4
Ib.w for bit field: b=bit, w=width
DP for Double Precision
An for ASCII: n=length of string

[*Write*]

Optional. Format to write in specified sequential file. If omitted, the value written will be unformatted and has the same representation as it does in memory.

I*n* Integer

Z*n* Short integer in hexadecimal notation

F*n.m*Floating point

E*n.m*Floating point in exponential form

A*n* ASCII
D Date (DD-MMM-YY) integer date is in minutes
T Time (HH:MM:SS) real data is in seconds
Where:
n is the width of the field and *m* is the number of decimal places.

See Also:

Entries M and R.

X (Demand Point Processing)

Purpose

Scans a point parameter value and forces processing of the point regardless of whether or not the point value has changed. This entry is used to force any algorithms attached to the point to be executed. Otherwise this entry is identical to the F (Fetch from point) entry.

Format

```
X Index Point_ID Parameter Print_Format
```

Description

Index

Number (1-999) identifying report variable to store value acquired from field.

Point_ID

Point name

Parameter

As described for entry type F. History parameters are not enabled.

Print_Format

As described for entry type F

See Also:

Entries A, G and F.

Free Format Report Example

This section shows an example of a report definition file and the resulting report output.

Report Definition File

```
*
*This is an example free format report
*Get the Point ID
F   1 01IT1LEVEL NAME   A10
*
*Get the last 10 history values and store at
*index 20..
F  20 01IT1LEVEL PV  F8.3  H1M(1) 10
*Get the maximum and minimum of these values and store at 50,51 respectively
L  50 01IT1LEVEL PV  F8.3  H1M(1) 10
*Store these values in user table 254 record 3 words 1,2
W  50   254     3     1        RL
W  51   254     3     4        RL
*Calculate the standard deviation for these history values
D  52 01IT1LEVEL PV  F8.3  H1M(1) 10
*Calculate the sum of these history values
T  53 01IT1LEVEL PV  F8.3  H1M(1) 10
*Take an average of these values and store it at index 1
C  11                   F8.3
P  11 = ($53)/10
P  70 = 1
P  71 = 2
P  72 = 3
P  73 = 4
P  74 = 5
P  75 = 6
P  76 = 7
P  77 = 8
P  78 = 9
P  79 = 10
*Store the result in the SP of a point
G  11 01OT1LEVEL SP
*
*Read some text from a file
M SEQ   501     0 c:\reports\freeformat\ffrdata.in
R  40   254     3 1     F8.3   RL    F8.2
*234567890123456789012345678901234567890123456789012345678901234567890
B:
-------------------------------------------------------
$C501
-------------------------------------------------------

For point '1       ' the latest 10 history values are:
$$1001 '20    '
```

```
The Sum of these values is ’53       ’
The Maximum value is ’50       ’(saved as ’40       ’)
The Minimum value is ’51       ’
The Standard Deviation is ’52       ’
The Average of these values is ’11        ’

$XY  70  20  10  0        10       0        75
```

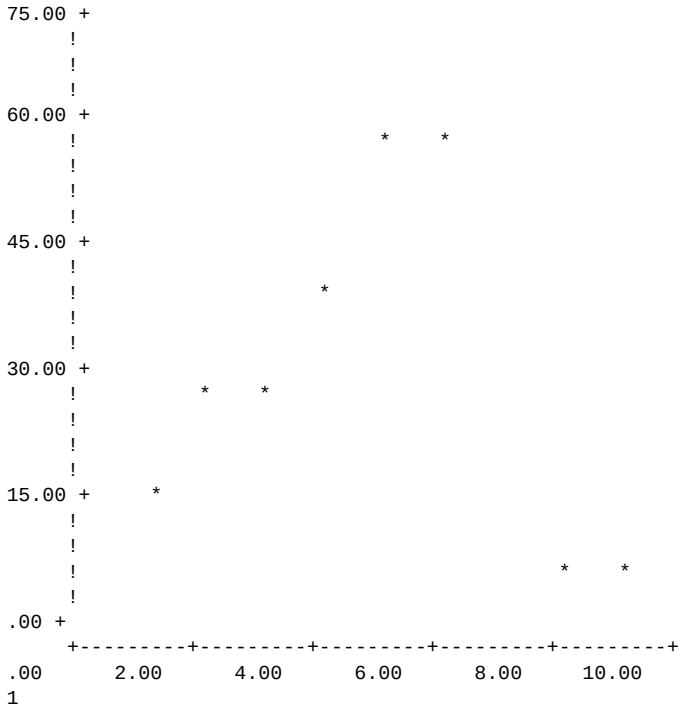
Report Output

```
P26-FEB-96 18:14:21 RPT003: freefmt    : FREE FORMAT REPORT  :DEMANDED:
PAGE 01
A
A     Example Free Format report
A

0
-----------------------------------------------------
Heading for Example report !!
-----------------------------------------------------

For point 01IT1LEVEL the latest 10 history values are :
     15.990
     27.500
     27.500
     38.950
     55.600
     55.600
     72.800
     6.900
     6.900
     6.900

The Sum of these values is 314.640
The Maximum value is 72.800 (saved as .000)
The Minimum value is        6.900
The Standard Deviation is       22.385
The Average of these values is       31.464
```


75.00
60.00
45.00
30.00
15.00
.00
.00
2.00
4.00
6.00
8.00
10.00
1

14 Configuring and Monitoring a Redundant Server System

PlantScape supports both dual networks and redundant servers, in any combination. For example, you can configure:

- Station connections to redundant servers over dual networks
- Redundant connections between redundant servers (recommended)

The following figure shows a sample network architecture drawing for a fully redundant system. A diagram like this is useful for checking the validity of your configuration and for finding problems during configuration and testing. If any node or network seems to be functioning incorrectly with respect to network communications, checking its configuration against the network architecture drawing is a quicker way to find any misconfiguration than just running diagnostics.

Your diagram should show:

- All network-connected computers running PlantScape Server or Station (generically called “nodes”)
- Single or dual network connected
- Network/subnetwork ID for each of the networks
- Name and IP address for each network interface card (NIC) connected anywhere on either network

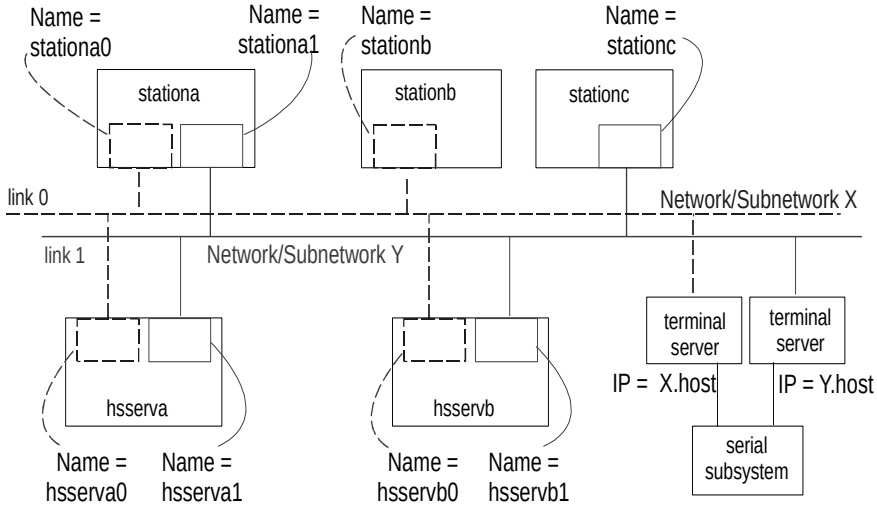


Figure 14.1 Sample Network Architecture Diagram

In this example, the system consists of:

- Dual networks `X` (link 0) and `Y` (link 1)
- Redundant servers, with base name `hsserv` and identifiers `a` and `b`. These servers are redundantly connected, which means that each has a NIC card for each network. The four server names are therefore `hsserva0` (hsserva connected to link 0), `hsservb0` (hsservb connected to link 0), `hsserva1` (hsserva connected to link 1), and `hsservb1` (hsservb connected to link 1).
- Stationa, which has a redundant connection to the redundant server. Stationa sees all four server names.
- Stationb, which has a single connection to the redundant server over network X. Stationb sees server names `hsserva0` and `hsservb0`.
- Stationc, which has a single connection to the redundant server over network Y. Stationc sees server names `hsserva1` and `hsservb1`.

The following sections contain:

- An overview of network redundancy (see “Network Redundancy” on page 303).
- Procedures for configuring primary and backup PlantScape servers to run in redundant mode (see “Server Redundancy Configuration Procedures” on page 305).

Network Redundancy

Two forms of network redundancy, both optional, are available for PlantScape servers and Stations:

- Ability for a pair of servers to perform database synchronization and other redundancy functions over a dual network (highly recommended to avoid a single point of failure)
- Ability of Stations to connect to non-redundant and redundant servers via dual networks

These capabilities are independent of each other and are configured separately. However, they have the same requirements for network configuration, which are described in this section. For dual network configuration procedures, see the *Installation Guide*.

Network Configuration Requirements

- Two networks that have distinct IP Subnet/Network IDs. The network redundancy scheme requires two NICs in the server or servers, and also in any Stations that participate in the dual network scheme. In the sample diagram and for this discussion, these networks are called X and Y.
- Two separate IP Networks (or subnets). One NIC in each participating server or Station must be connected to one cable/hub. The other NIC in each participating server or Station must be connected to the other cable/hub.
- All NICs connected to the first cable/hub have the same network/subnetwork ID, X.
- All NICs connected to the second cable/hub have the same network/subnetwork ID, Y.
- All IP addresses on either network must have the form X.host or Y.host. This is a consequence of the required NIC connections. If you are not careful to ensure this, you can create some very difficult situations to debug.

The IP address assigned to NIC A in a node has no relationship to the IP address assigned to NIC B in the same node, but both addresses must comply with these network and subnetting requirements. If you need to use certain IP addresses because of their availability, you must ensure that they are on the correct subnet.

However, the naming (or at least alias) scheme given to these nodes is important for servers (for example: hsserva, hsservb, hsserva0, hsserva1, hsservb0, hsservb1). This naming convention enables each redundant server to find the other and programs like Microsoft Excel Data Exchange and ODBC Driver to "autofind" the current primary server based on a "base name" (hsserv in the example) for the pair of servers.

It is important that the hsserva0 and hsservb0 names are both associated with the X network, and the hsserva1 and hsservb1 names are both associated with the Y network.

Station Network Redundancy

To configure Station Network redundancy, you use Station setup (menu option Station ⇒ Connect) on each Station to define auxiliary setups that round robin among any number of server connections (see "Single Network Configuration" on page 306). The Station software works its way through the configured sequence of connection setups until it finds a connection to the current primary server.

Stations connected to a single server on dual networks see two names for the server (for example, hsserv0, hsserv1) and need two station setup files, each pointing to the other in the **Use redundant connection** field.

Stations that are connected to redundant servers on dual networks see four names for the pair of servers (for example, hsserva0, hsserva1, hsservb0, hsservb1). These stations need four Station setup files, configured so that each auxiliary setup field points to the next Station setup file in the desired round robin sequence, with the fourth file pointing back to the first to complete the loop (see "Configuring Stations for Server Redundancy" on page 317).

You must determine whether each Station will be on a single or a dual network. If it is on a single network, just ensure that the IP network/subnetwork ID for that Station's NIC is consistent with other nodes attached to the network (i.e. X on the X network, or Y on the Y network).

Stations connected to redundant servers on a single network see two server addresses for the pair of servers (for example, hsserva0 and hsservb0 **OR** hsserva1 and hsservb1. In this case there might still be a dual network present and being used for the servers and some Stations; it is not mandatory to connect all Stations to a dual network if one exists.

Redundant Server Network Redundancy

Server network redundancy between redundant servers is configured through **hdwbld** (see "Defining the Redundant Connections" on page 311).

Server Redundancy Configuration Procedures

The following procedures assume that you have completed a redundancy installation as described in the *Installation Guide*.

Prerequisites for Configuring Server Redundancy

At this point you should have installed Windows and the PlantScape Server software as described in the installation guide. Specifically, you should have:

- Set up the computer names for your primary and backup servers

  Note It is important that you follow the correct server naming convention for redundant server systems when you install Windows. See the *Installation Guide* for details.
- Installed the network cards in the primary and backup servers
- Configured TCP/IP on the primary and backup servers and assigned a TCP/IP address to each network card
- Installed PlantScape software on the primary and backup servers

Server Redundancy Configuration Steps

Configuring the primary and backup servers to run in redundant mode requires the following steps:

1. Complete the TCP/IP configuration by configuring the primary and backup server `hosts` files and testing the TCP/IP configuration of the servers (see "Completing the TCP/IP Configuration of the Servers" on page 306).
2. Define the redundant connections (see "Defining the Redundant Connections" on page 311).
3. Synchronize the date and time on the servers (see "Synchronizing Date and Time on the Servers" on page 315).
4. Configure Station setup files for redundancy (see "Configuring Stations for Server Redundancy" on page 317).
5. Synchronize the servers (see "Synchronizing the Server Databases" on page 320).

Completing the TCP/IP Configuration of the Servers

This section describes how to complete the configuration of your primary and backup servers and how to test your configuration. It assumes that your primary server is called **hsserva** and your backup server is called **hsservb**.

For most information about configuring TCP/IP for servers, see the *Installation Guide* and the Microsoft Windows documentation.

Single Network Configuration

In a single network configuration, both servers are connected on a single network and have a single network card installed. The following figure shows an example of a single network configuration.

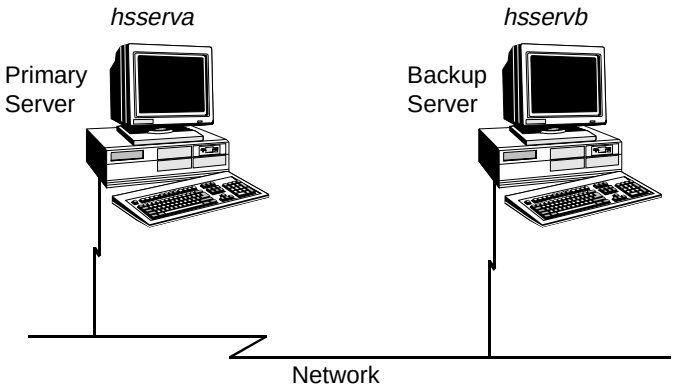


Figure 14.2 Single Network Configuration

Modifying the hosts File

The following procedures assume that the TCP/IP address of **hsserva** is 200.0.0.1 and the TCP/IP address of **hsservb** is 200.0.0.2.

To modify the hosts file:

1 Use a text editor to edit the `hosts` file. (**Note:** If you use Microsoft Notepad to edit the `hosts` files, you need to remove the `.txt` file extension after you save the files.)

The `hosts` file is:

`%SystemRoot%\system32\drivers\etc\hosts`

For example:

`c:\winnt\system32\drivers\etc\hosts`

2 Add the following lines to the `hosts` file:

```
# TCP/IP address for primary
200.0.0.1 hsserva hsserva0
# TCP/IP address for backup
200.0.0.2 hsservb hsservb0
```

Remember to use the base server name and TCP/IP addresses that are applicable to your site. For example, if your primary server is called **hsserva** and has a TCP/IP address of 200.10.10.1 and your backup server is called **hsservb** and has a TCP/IP address of 200.10.10.2, then you would add the following lines to your `hosts` file:

```
# TCP/IP address for primary
200.10.10.1 hsserva hsserva0
# TCP/IP address for backup
200.10.10.2 hsservb hsservb0
```

Testing the TCP/IP Configuration

After you have modified the hosts file on both servers, you should test the TCP/IP configuration on both servers.

To test the TCP/IP configuration:

1 Open a Command Prompt window.

2 Ping each host name in turn; for example, enter the following commands one by one:

```
ping hsserva
ping hsserva0
ping hsservb
ping hsservb0
```

3 If any requests time out, or if the incorrect TCP/IP address is pinged, go back and re-examine your TCP/IP configuration. Refer to the installation guides for PlantScape and Windows for more information, if necessary.

Dual Network Configuration

In a dual network configuration the servers are connected on two networks and have two network cards as illustrated in the following figure.

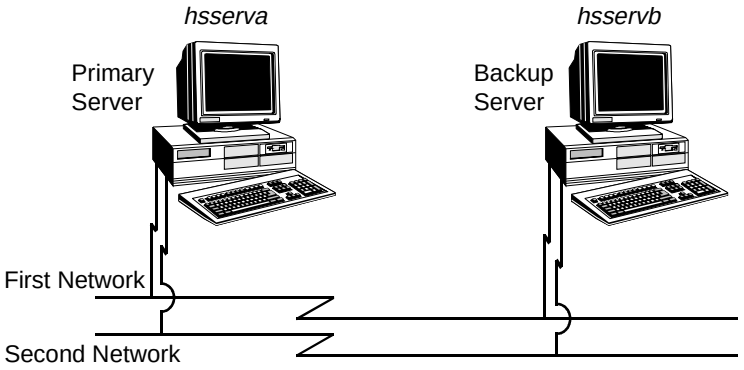


Figure 14.3 Dual Network Configuration

Modifying the hosts File

The following procedures assume that:

- For **hsserva** the TCP/IP address for the first network card is 200.0.0.1 and for the second network card the TCP/IP address is 200.0.1.1.
- For **hsservb** the TCP/IP address for the first network card is 200.0.0.2 and for the second network card the TCP/IP address is 200.0.1.2.

To modify the hosts file:

1 Use a text editor to edit the `hosts` file on the primary and the backup server. (**Note:** If you use Microsoft Notepad to edit the `hosts` files, you need to remove the `.txt` file extension after you save the files.)

The `hosts` file is:

```
%SystemRoot%\system32\drivers\etc\hosts
```

For example:

```
c:\winnt\system32\drivers\etc\hosts
```

2 Add the following lines to the `hosts` file:

```
# First TCP/IP link of the primary
200.0.0.1 hsserva hsserva0
# First TCP/IP link of the backup
```

```
200.0.0.2 hsservb hsservb0
# Second TCP/IP link of the primary
200.0.1.1 hsserva1
# Second TCP/IP link of the backup
200.0.1.2 hsservb1
```

Remember to use the base server name and TCP/IP addresses that are applicable to your site. For example, if your primary server is called **hsserva** and has TCP/IP addresses of 200.10.10.1 and 200.10.11.1, and your backup server is called **hsservb** and has TCP/IP addresses of 200.10.10.2 and 200.10.11.2, then you would add the following lines to your `hosts` file:

```
# First TCP/IP link of the primary
200.10.10.1 hsserva hsserva0
# First TCP/IP link of the backup
200.10.10.2 hsservb hsservb0
# Second TCP/IP link of the primary
200.10.11.1 hsserva1
# Second TCP/IP link of the backup
200.10.11.2 hsservb1
```

Testing the TCP/IP Configuration

After you have modified the hosts file on both computers, you should test the TCP/IP configuration on both computers.

To test the TCP/IP configuration:

1. Open a Command Prompt window.
2. Ping each host name in turn; for example, enter the following commands one by one:

```
ping hsserva
ping hsserva0
ping hsserva1
ping hsservb
ping hsservb0
ping hsservb1
```

3 If any requests time out, or if the incorrect TCP/IP address is pinged, go back and re-examine your TCP/IP configuration. Refer to the *Installation Guides* for PlantScape and Windows for more information, if necessary.

Defining the Redundant Connections

Details about the connection between the two servers in a redundant server system are defined using entries in a hardware definition file. The following details need to be specified for the connection:

- The Redundant Arbitration method (see the description of Redundant Arbitration below)
- The data links between the primary and the backup servers

To define the redundant connections in the server database, you need to create entries in a hardware definition file and then run the **hdwbld** utility to define the details in the server database.

Redundant Arbitration

Redundant arbitration is the task of deciding which of the servers will run as the primary (that is, communicating with field devices and Stations) and which will run as the backup (providing a standby system in case the primary fails).

The method of arbitration is called Software arbitration.

Software Arbitration

When software arbitration is used, software running on the primary and backup servers provides the arbitration. Each server polls the other (via the network) so that it knows if the other server has failed.

For example, if **hsserva** is running as the primary server and fails, the arbitration software running on **hsservb** detects this and switches from running as backup to running as primary.

Figure 14.4, “Software Arbitration” on page 312 illustrates software arbitration.

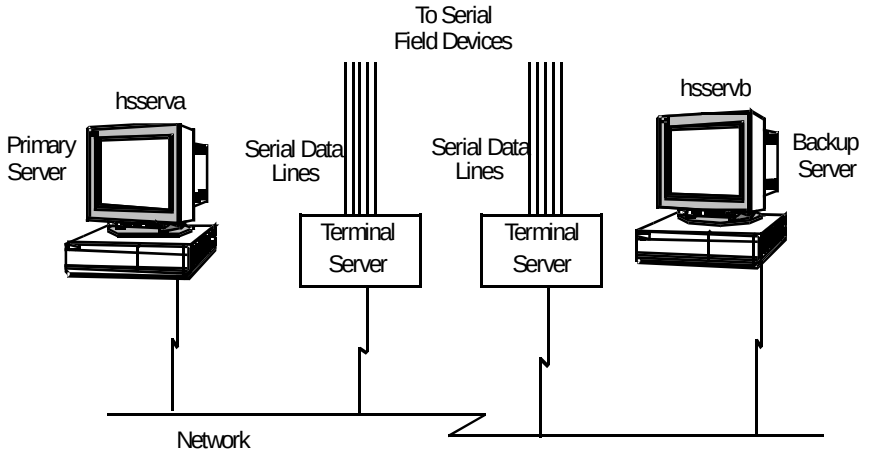


Figure 14.4 Software Arbitration

When software arbitration is used, terminal servers provide the data link between the servers and the serial field devices.

The server running as primary communicates with the field devices (via the terminal servers). If the primary server fails, the backup server becomes the primary and takes over communications with field devices.

Defining the Arbitration Method

The arbitration method to be used in your redundant server system must be defined for the primary and backup servers as follows:

1. Specify the arbitration method in a hardware definition file and copy this file to the primary and backup servers.
2. Run the **hdwbld** utility on the primary and backup servers to store this connection definition in the PlantScape database.

While the **hdwbld** utility is being used to define the arbitration method and to build the data links, the PlantScape server state must be `Database Only`.

For information about the content and syntax of hardware definition files and how to run the **hdwbld** utility, refer to the *Hardware and Point Build Reference*.

An example hardware definition file (which you can modify and use) is shipped with PlantScape. The file is called `redun.hdw` and is located in `\server\user`.

Hardware Definition File Entries for Software Arbitration

You define software arbitration as follows in a hardware definition file:

```
DEL PSW00
ADD PSW00 NETWORK_PSW RECOVER=recover_option
```

Where:

`recover_option`

Is `ABORT` or `REBOOT. ABORT` means that when a failover occurs, PlantScape Server is stopped and restarted on the failed server. `REBOOT` means that when a failover occurs, PlantScape Server is stopped and the database unloaded on the failed server. The server is then restarted.

Example The following hardware definition file entries would be used for a redundant server system with software arbitration. When a failover to the backup server occurs, PlantScape is stopped and restarted on the primary server.

```
DEL PSW00
ADD PSW00 NETWORK_PSW RECOVER=ABORT
```

Data Links between Primary and Backup Servers

When the primary and backup servers are running in redundant mode, all database changes on the primary server are sent to the backup server via one or more data links. (A data link is a network path between the primary server and the backup server.)

Hardware Building the Data Links

A hardware definition file must be created defining the data links. This file must be hardware built (using the **hdwbld** utility) on both servers.

The example hardware definition file `\server\user\redun.hdw` also includes data link definition examples.

Single Network Data Link Definition

The single network data link configuration is illustrated in Figure 14.2, “Single Network Configuration” on page 306.

You define the single data link as follows in a hardware definition file:

```
DEL LNK00
ADD LNK00 NETWORK_LINK
```

Dual Network Data Link Definition

The dual network data link configuration is illustrated in Figure 14.3, “Dual Network Configuration” on page 308.

You define the dual data links as follows in a hardware definition file:

```
DEL LNK00
ADD LNK00 NETWORK_LINK
DEL LNK01
ADD LNK01 NETWORK_LINK
```

Synchronizing Date and Time on the Servers

The date and time on the primary and backup servers need to be synchronized to ensure that all dates and/or times associated with events in the database are consistent between servers.

In a redundant server system, the primary server is used as the *time source* and the backup server is configured to synchronize with the primary server.

To configure the backup server so that it synchronizes with the primary server, you need to run the Microsoft Time Service application on the backup server.

To synchronize the backup server with the primary server, perform the following steps on the backup server:

1. Run the following command to open and edit the `timeserv.ini` file:

   `notepad %SystemRoot%\timeserv.ini`

   Where:

   `%SystemRoot%` is the path to the ini file. For example:

   `c:\winnt\timeserv.ini`

2. In the `timeserv.ini` file, replace the word `TIMESOURCE` with the name of the primary server (for example, `hsserva`).
3. Save the file and exit Notepad.
4. Run the commands:

   `timeserv -update`

   `timeserv -automatic`

5. Run the command:

   `net start “time service”`

Note Before starting the Time Service, ensure that the primary and backup servers are configured to be in the same time zone. The time zone setting can be checked by opening **Date/Time** in the Windows Control Panel.

Re-Synchronizing the Date and Time on the Servers

The Time Service synchronizes the system time with the primary server every hour.

If you change the time on the primary server (or the primary server is down for some period of time) and you want the backup server to synchronize immediately, you need to stop and restart the Time Service on the backup server as follows:

1. In the Windows Control Panel ⇒ Administrative Tools, open Services.
2. Stop and start the Time service.

A number of advanced options are available with the Time Service application. For details of these options, refer to the file `timeserv.htm`, located in `\server\setup`, and to `timeserv.ini`, located in `%SystemRoot%` (usually `c:\winnt`).

Configuring Stations for Server Redundancy

Stations need to connect to whichever server is running as the primary server.

However, for local and network-connected Stations to always connect to the server running as primary requires special Station configuration. How this is done for single and dual networks is described in the following sections.

Single Network Configuration

In a single network configuration when a Station connection to the primary server is lost (or the primary server fails), the Station should attempt to connect to the backup server.

Similarly when the backup server stops running as primary, the Station should try to reconnect to the primary server.

You can configure Station to do this by configuring an auxiliary setup file. The auxiliary setup file contains the name of the server to connect to if the current connection is lost (or the current server fails).

In the case of a single network configuration, two Station setup files are required:

- `default.stn` which connects to **hsserva** (and has auxiliary setup file `hsservb.stn`)
- `hsservb.stn` which connects to **hsservb** (and has auxiliary setup file `default.stn`)

When Station is started, it connects to **hsserva** (as configured in `default.stn`). If **hsserva** fails (or connection to **hsserva** is lost), Station reconnects to **hsservb** (as configured in the auxiliary setup).

For details on configuring setup files see “Configuring Station Connections” on page 63 and “Connection Properties Dialog Box” on page 69.

Dual Network Configuration

Dual network configuration is more complicated than single network configuration because there are two data paths (networks) via which an operator Station can connect to the server running as primary.

In dual network configuration when Station connection to the primary server is lost (or the primary server fails) the Station attempts to connect to the backup server via the same network.

If Station is unable to connect to the backup server via the first network Station attempts to reconnect to the primary server via the second network.

If Station is unable to connect to the primary server via the second network Station attempts to connect to the backup server via the second network.

This way both servers and both networks are tested by Station in an attempt to make a valid connection.

In this case, four Station setup files are required:

- `default.stn` which connects to **hsserva0** via the first network (and has auxiliary setup file `hsservb.stn`)
- `hsservb.stn` which connects to **hsservb0** via the first network (and has auxiliary setup file `hsserva1.stn`)
- `hsserva1.stn` which connects to **hsserva1** via the second network (and has auxiliary setup file `hsservb1.stn`)
- `hsservb1.stn` which connects to **hsservb1** via the second network (and has auxiliary setup file `default.stn`)

When Station is started it connects to **hsserva** (as configured in `default.stn`).

If **hsserva** fails (or connection to **hsserva** is lost), it connects to **hsservb** (via the same network). If it fails to connect to **hsservb** it attempts to reconnect to **hsserva** (via the second network, **hsserva1**). If it fails to connect to **hsserva**, it attempts to reconnect to **hsservb** (via the second network **hsservb1**). If it fails to connect to **hsservb**, it then attempts its initial connection (**hsserva** via the first network) again.

In addition to specifying the auxiliary files, you need to ensure that Station can access displays by:

- Ensuring your TCP/IP settings you have selected Enable DNS for Windows Resolution (Windows NT only).
- Ensuring the host files include the host server names.
- Creating the network connections on the computer running Station.
- The relevant network paths are added to the Displays tab in the Connection Properties dialog box for all of the required .stn files.

For details on configuring setup files see “Configuring Station Connections” on page 63 and “Connection Properties Dialog Box” on page 69.

Configuring Stations for Microsoft Internet Explorer

Many Station displays use Microsoft Internet Explorer. On a redundant network, Internet Explorer must be able to resolve the server names to a hostname or IP addresses. The configuration steps are:

On all computers running Station other than the servers:

1. Open the hosts file in `%SystemRoot%\system32\drivers\etc.`
2. Add the server aliases exactly as in the host file on the server.

Example For redundant servers called `hsserva` and `hsservb` where `hsserva` has IP addresses `200.0.0.0` and `200.0.10.`0 and `hsservb` has IP addresses `200.0.0.1` and `200.0.10`, you would add the following lines to the `hosts` file:

```
200.0.0.0          hsserva hsserva0
200.0.0.1          hsservb hsservb0
200.0.10.0         hsserva1
200.0.10.1         hsservb1
```

To check the server name, choose **Start ⇒ Settings ⇒ Control Panel ⇒ System** on the server. The server name is displayed in the **Full Computer Name** field of the Network Identification tab.

Synchronizing the Server Databases

At this point the PlantScape Server redundancy configuration is complete. The primary and backup servers can now be put into redundant mode.

Synchronization is the process of copying over the PlantScape Server database from the primary server to the backup server. When the Server database on the backup server is identical to the database on the primary server, the servers are said to be *synchronized*.

Note The process whereby database changes on the primary server are automatically sent to the backup server is known as *automatic checkpointing*. Automatic checkpointing from the primary to the backup server does not occur until the two servers have been synchronized.

To synchronize your servers:

1. Start PlantScape on the primary server and connect a Station to it.
2. Call up the Server Redundancy Status display by selecting **View** ⇒ **System Status** ⇒ **Server Redundancy** from the Station menu.

   Note For information about the fields in this display, see "Monitoring Redundant Servers" on page 321.
3. Start PlantScape on the backup server.

   Within several minutes the LEDs in the **Link Status** group should change from red to green and indicate the following:
   - **Running**
   - **Link** n **(LINK0**n**)**
4. Select the **Synchronize** button to synchronize the two servers.

   The PlantScape database on the primary server will be automatically copied to the backup server.

   Within a few minutes the systems should be synchronized and running in redundant mode.

   The synchronization indicator (the first LED in the **Backup Server** group) should change from red to green and the text change from **Unsynchronized** to **Synchronized**.

Monitoring Redundant Servers

Once the servers are running in redundant mode, you can use a number of methods to monitor the status of your system.

Using Station to Monitor Redundant Servers

You can use the Server Redundancy Status display on Station to:

- Determine which server is currently running as the primary
- Determine whether the servers are synchronized
- Synchronize the servers
- Manually fail over to the backup server
- Monitor the redundancy queue availability and data transfer rates
- Change the checkpoint period

To call up the Server Redundancy Status display select **View ⇒ System Status ⇒ Server Redundancy** from the Station menu.

A description of some of the fields on the Server Redundancy Status display follows:

Property	***Description***
Queue Availability	PlantScape uses a queue to buffer database information to be sent from the primary to the backup server. On the Server Redundancy Status display the **Availability** field shows the percentage of the queue size. In the course of normal operations, this number should be close to 100. If the number is less than 100%, then there is currently data in the queue that needs to be transferred to the backup server.
Availability threshold	When you specify a value in the **Availability threshold** field, the system will record the amount of time that the queue availability drops below the specified percentage
Checkpoint period	The checkpoint period is the cyclic period that the contents of the memory-resident part of the database are sent to the backup server. The default value is 300 seconds (5 minutes). This value is not normally changed.
Link transfer rate	The Link Transfer Rate value gives a measure of the throughput of the redundant link.

Property	*Description*
Tracing mask	The Tracing Mask value is used for diagnostic purposes. Do not change this value unless advised to do so by Honeywell support staff.

Using Points to Monitor Redundant Servers

A point definition file, called `redun.pnt` and located in `\server\user` is supplied to define points to monitor the redundant server queue. The points are:

Point	*Description*
redun_ack_no	Monitors the last acknowledged message number
redun_cur_q_ava	Monitors the amount of free queue space as a percentage
redun_msg_no	Monitors the current message number
redun_syncd	Monitors whether the servers are synchronized
redun_xfer_rate	Monitors the transfer rate of the queue

It is quite useful to configure a trend set which displays these points so that the status of the redundant server system can be monitored.

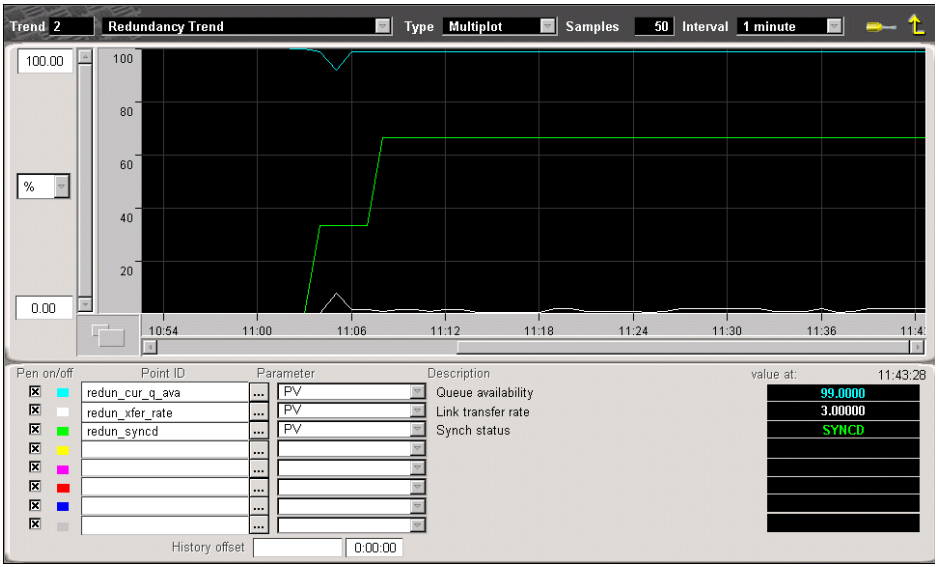


Figure 14.5 Trend Display for Monitoring Redundant Server System

For more information on configuring and using trend sets, refer to "Configuring Trend Set Displays" on page 230 in this Guide, and to the *Operators Guide*.

Synchronizing Other Files

PlantScape database information is automatically transferred from the primary server to the backup server. Any configuration changes to the database (such as changes to points and displays) are also transferred.

You might also want automatic copy of other files after they are modified on the primary server, such as the Quick Builder database, custom displays, application source files, and history archives.

To specify which files are to be copied, you edit the configuration file `\server\data\flbkup.def` on both the backup and primary servers.

Uncomment existing lines or add new lines. The file uses the following syntax. Lines starting with:

* - Are comment lines

S - Specify a folder to be copied. All subfolders are also copied unless excluded by the X entry

X - Specify a folder not to be copied to the backup

There should be one line in the file starting with a T. This line records the date and time of the last successful transfer. This entry should not be changed.

Example If you want your Quick Builder database, custom displays, and history archives copied to the backup server, the `flbkup.def` would look like this:

```
T  11/11/99 10:56:15
*  Copy the Quick Builder database to the backup
S  \client\qckbld
*  Copy custom displays to the backup
S  \client\abstract
*  Copy history archives to the backup
S  \server\archive
```

Files are copied periodically from the primary to the backup server. The default period is 60 minutes. For information on changing this default see “Changing the Default Transfer Period” on page 325.

During synchronization the file transfer program attempts to transfer files from the indicated directories on the primary server to the backup server. The time and date that the file transfer program ran is recorded. During periodic transfers the file transfer program attempts to transfer any files from the indicated directories that have changed since the last time the program ran. Files are transferred if either:

- The file does not exist on the backup server
- The date and time stamp on the backup server differs by more than 60 seconds to the date and time stamp on the primary server, even if the file on the secondary server is newer.

Changing the Default Transfer Period

You can change the default transfer period, by adding an option to the link add line in the redundancy hardware build file. The redundancy hardware build file is found in the `\server\user\redun.hdw`.

The following example changes the transfer period to 30 minutes for a dual network.

Example

```
DEL LNK00
ADD LNK00 NETWORK_LINK DAEMON_VALUE2=30
DEL LNK01
ADD LNK01 NETWORK_LINK DAEMON_VALUE2=30
```

Failover of a Redundant Server System

The backup server takes over from the primary if:

- The primary server hardware fails and the backup cannot communicate with it
- All network links between the primary and backup server are broken
- The primary loses C200 communications because of a non-recoverable failure in its C200 communications subsystem
- A user does a manual failover (see "Manually Failing Over a Redundant Server System" on page 327)

The primary server can be configured to restart (with the backup server becoming primary) if one of the following tasks fails:

- `timer` (controls timing of all PlantScape Server tasks)
- `scanx` (controls the SCADA scanning subsystem)
- `daqmgr` (controls the delivery of SCADA acquisition requests to the appropriate SCADA driver)

The backup server does not take over from the primary if a SCADA channel fails.

Manually Failing Over a Redundant Server System

There might be times when you want the backup server to run as the primary for a while. For instance, you may want to upgrade your primary server in some way (for example, upgrade memory, upgrade the hard disk or install a Windows Service Pack).

PlantScape supports manual (operator-controlled) failover from the primary server to the backup server. This failover causes the backup server to run as the primary.

Caution

- If you manually fail over your PlantScape system the primary and backup servers lose synchronization. The servers need to be resynchronized if they are to run in redundant mode again.

  The automatic transfer of database updates from the primary server to the backup server does not occur until the two servers have been synchronized.
- When you want to fail back to your primary server after a failover, you must first resynchronize your servers. If you do not resynchronize them you lose changes to the PlantScape database that were made while the backup server was running as the primary.
- Stopping PlantScape on your primary server also causes your system to fail over to the backup server. If you do not want this to happen, you should always stop your backup server before stopping your primary server.

To manually fail over:

1. Open the Server Redundancy Status display
2. Click **Manual Failover**. This notifies the backup server that it is to run as the primary.

   Note If the primary servers services are manually stopped, operator intervention is required for Station to connect to the backup server.

What To Do If the Servers Lose Synchronization

Because PlantScape is a high availability system, it is very important to recognize quickly if the servers lose synchronization (that is, stop running in redundant mode).

The servers may lose synchronization if:

- The primary server suffers a hardware/software failure
- The backup server suffers a hardware/software failure
- The communications link(s) between the servers is broken

If there is a redundancy problem, urgent alarms are generated. You should immediately call up the Redundancy Status display to confirm whether synchronization has been lost and to determine which server is running as the primary. (The Server Redundancy Status display is automatically called up if you double-click a redundancy alarm.)

Once you have confirmed that there is a problem with one of the servers or the communications link between the servers, the problem should be rectified as soon as possible and the servers put back into redundant mode.

If the Primary Server Fails

If the primary server fails, your PlantScape system will fail over and the backup server becomes the primary. In this case you should:

1. Determine the cause of the problem on the primary server and rectify it. (If there was a hardware fault, some part of the hardware may need to be replaced.)
2. Reconfigure or re-verify (depending on the cause of the problem) the redundancy configuration on the primary server. (Refer to “Completing the TCP/IP Configuration of the Servers” on page 306.)
3. Resynchronize the primary and backup servers. In this case the contents of the PlantScape database on the backup server (which is running as the primary) are transferred to the primary server.
4. Manually fail over to the primary server (once the servers are synchronized). The primary server then runs as primary again.
5. Resynchronize the primary and backup servers.

If the Backup Server Fails

If the backup server fails, your PlantScape system runs normally, but it will not be running in redundant mode. You should:

1. Determine the cause of the problem on the backup server and rectify it.
2. Reconfigure or re-verify (depending on the cause of the problem) the redundancy configuration on the backup server. (Refer to "Completing the TCP/IP Configuration of the Servers" on page 306.)
3. Resynchronize the primary and backup servers.

If There Is a Communications Failure

The servers can lose synchronization if there is a network failure and the data link between the servers is broken.

Under software arbitration the servers cannot poll each other to determine which is the primary. The backup server also starts running as the primary.

If the primary server is running correctly, you should stop the backup server.

When the network link is restored:

- Start the backup server
- Resynchronize the primary and backup servers

Server Redundancy Fast Failover Configuration

Normally Station reconnect time is approximately 30 seconds. It is possible to tune server and Station redundancy timeout parameters to achieve approximately 10 second Station reconnect time (also known as fast failover).

Configuring fast failover is only recommended for high performance servers running on high performance networks, because it increases:

- The traffic that the Stations and Servers put onto the network
- The Servers' susceptibility to failover from disruptions on the network

One way to improve failover time without affecting network performance is to define IP addresses in the hosts files so that IP address resolution is faster (see "Making IP Address Resolution Faster" on page 333).

If you want to configure fast failover, you set parameters for:

- The time until the backup server becomes primary after it detects that the primary is down (see "Time Until Backup Server Becomes Primary" on page 330)
- The time until the Server allows a new Station connection to use a Station number after a Station connection fails (see "Time Until Server Disconnects Station" on page 331)
- The time until a Station fails over to the backup network after a connection to the Server fails (see "Time Until Stations Fail Over to Backup Network" on page 332)

Time Until Backup Server Becomes Primary

To tune the time until the backup server becomes primary after it detects that the primary server is down, you reset the number of messages permitted to be lost before failover occurs. The following steps must be performed on both the primary and backup Server:

1. Open a Command Prompt window and enter the command **`hscserver /database`** to stop the PlantScape Server.
2. Isolate the network between the servers from other network traffic.
3. Edit the PSW00 line in the redundancy configuration file, `\server\user\redun.hdw`
   - For fast failover, add `IDLE=5 READ=10` to the **PSW00** line
   - For normal operation, delete the **IDLE** and **READ** values from the **PSW00** line, or set the default values **`IDLE=10 READ=15`**.

For example:

```
ADD PSW00 NETWORK_PSW RECOVER=ABORT IDLE=5 READ=10
```

4 From the command prompt, run the command **`hdwbld redun.hdw`** to make the changes effective.

5 Use Start/Stop PlantScape Server to set the Server state to **System Running**.

Time Until Server Disconnects Station

Set the time that the server waits for data from a Station before disconnecting it. The fast failover setting is 5; the normal setting is 30.

Note If you adjust this setting, you must also adjust the time until Stations fail over to the backup network. If the settings are not properly synchronized, the Stations will disconnect frequently.

---

1 On the primary server, and then on the backup server, open a command prompt and run (**bold** indicates your entries):

```
C:\>fileio
Database contains    400 files
File number (=0 to exit) ? 8
Use memory image [YES|NO|BOTH(default)] ? both
File   8 contains        1 records of size    4096 words
Record number (=0 to back up) ? 1
Word offset (=0 to back up) ? 82
Mode = 0 to back up
     = 1 for INTEGER      (int2)
     = 2 for HEX          (int2)
     = 3 for ASCII        (int2)
     = 4 for F.P.         (real)
     = 5 for SET bit      (int2)
     = 6 for CLR bit      (int2)
     = 7 for LONG INTEGER (int4)
     = 8 for LONG F.P.    (dble) ? 1
 INTEGER VALUE =        30  NEW VALUE = 5
Save value [YES|NO (default)] ? yes
Word offset (=0 to back up) ? 0
Record number (=0 to back up) ? 0
File number (=0 to exit) ? 0
```

Time Until Stations Fail Over to Backup Network

The time until a Station fails over to the backup network depends on:

- The **KeepAliveTimeout** and **DisConnectTimeout** settings in the **station.ini** file.
- The **TcpMaxConnectRetransmissions** setting in the registry.

Note If you adjust the timeout settings, you must also adjust the time until the server disconnects Station. If these times are not properly synchronized, Stations will disconnect frequently.

To change the KeepAliveTimeout and DisConnectTimeout settings for a computer:

1. Edit the file `%SystemRoot%\station.ini`. In the [Station] section, add or uncomment the lines:
   - For fast failover:
     `KeepAliveTimeout=30`
     `DisConnectTimeout=30`
   - For default failover:
     `KeepAliveTimeout=150`
     `DisConnectTimeout=150`

   Both timeouts are in units of 0.1 seconds.
2. Edit the registry entry for **TcpMaxConnectRetransmissions**:
   a) From a command prompt, enter **`Regedt32`**.
   b) Open the path `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters`
   c) Open **TcpMaxConnectRetransmissions.** If it does not exist, use Edit ⇒ Add Value to add it. The **Data Type** is **REG_DWORD**.
   d) In the DWORD Editor, enter **0** for fast failover, or **Decimal 3** for default failover. Then select **`OK`**.
   e) Exit Registry Editor. You need to restart the computer to use the new setting.

Making IP Address Resolution Faster

One way to achieve faster failover without necessarily increasing network traffic is to define IP addresses in the hosts files of all computers on the network:

1. On all Station PCs, ensure that there is an entry in the hosts file **(%SystemRoot%\system32\drivers\etc\hosts)** for both server computers.
2. On both server computers, ensure that there is an entry in the hosts file **(%SystemRoot%\system32\drivers\etc\hosts)** for every Station computer.

Note Stations configured as static stations reconnect marginally more quickly than those configured as rotary stations.

15 Configuring Distributed Server Architecture

The Distributed Server Architecture option enables multiple PlantScape servers to share point data, alarms, messages, and history without the need for duplicate configuration on any server. This chapter discusses the architecture and functions of a distributed server system and the configuration procedures that are required.

Overview

The Distributed Server Architecture option enables you to integrate multiple PlantScape servers into a single operational system, with little engineering effort.

It is effective for geographically distributed systems, for logically separate PlantScape systems located in different parts of a plant, and for combinations of the two.

Geographically distributed systems collect data from a wide area and need to be controlled locally and remotely. Common configurations include a master control center accessing data from several remote sites, which might each contain several servers and which can also exchange information. Communication bandwidth of the network between the servers is typically less than that available within an individual plant.

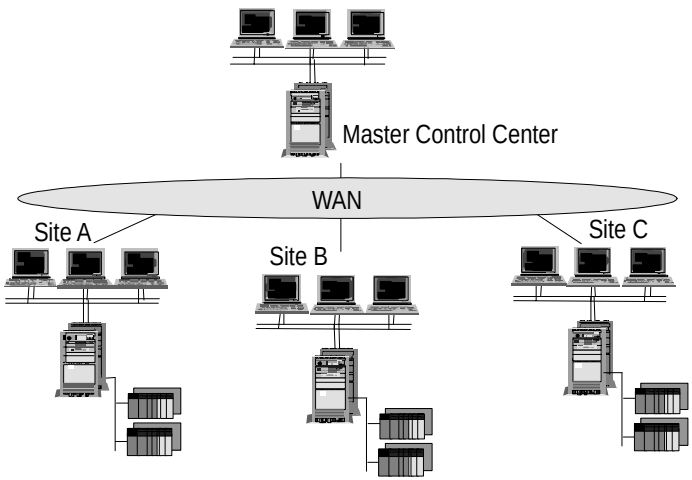


Figure 15.1 Geographically Distributed System

In a plant-wide system, data is typically shared between servers over a high-bandwidth network, such as a 10Mb or higher Ethernet. In this case each server is assumed to be responsible for controlling a different part of the plant. Typically there are multiple control rooms, or multiple stations in the same control room, each associated with a specific server.

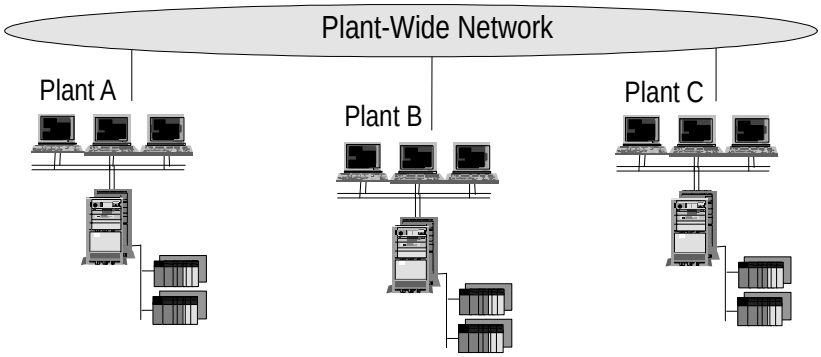


Figure 15.2 Plant-Wide Distributed System

The requirements for implementing a distributed server architecture for PlantScape are:

- Areas must be enabled.
- Area codes must be unique across all servers (see "Alarms" on page 343).
- All points assigned to an area must be defined on the server where the area is local.
- Point IDs must be unique across all servers (see "Point IDs" on page 339).
- Every point that will be accessed from more than one server must be assigned to an area.
- Each server database must contain definitions for its local areas and for all remote areas that it needs to access.
- Each server database must contain a definition for itself (This Server) and for all servers it needs to access. On each server, the definition for "This Server" includes an alias for use on the other servers (see "Configuring Servers to Share Data" on page 352).
- All displays that a Station needs to access must be accessible through the Displays Path defined for the Station.
- Alarm message indexes and text should be the same on all servers (see "Specifying an Alarm Message Index" on page 165).
- Each server database must contain all acronyms used on any displays it needs to access, including those copied from remote servers.

Data Access

Distributed Server Architecture provides global access to point parameter data on all servers in the system. Each server provides automatic dynamic caching of remote data for all of its clients, so that clients access their local Server for all data. Clients do not access remote Servers directly.

For example:

- Station accesses its local server to display alarms for points on local and remote servers.
- Station accesses its local server to display data for points on local and remote servers.
- An OPC client application can access a local OPC server on a PlantScape server to obtain point data from that or any other PlantScape server.
- A Microsoft Excel spreadsheet connected only to its local server can display data through Microsoft Excel Data Exchange from multiple servers.
- An application, or a network application, connected only to its local server can access point data from multiple servers.

A server establishes a local cache point (see How Remote Points are Located) and subscribes to a remote server when one of its clients requests data for a point that is not already in the database. While the subscription is in effect the data owner uses report by exception, only sending data to the caching server on change. When the data is no longer referenced by any of its client Stations or applications, the subscribing server cancels the subscription to the data owner. This subscription mechanism ensures maximum efficiency both on the servers and over the network.

How Remote Points are Located

Distributed Server Architecture provides a global name space for access to all point information in the system (see “Point IDs” on page 339).

The first time a remote point is accessed, the local server asks the configured servers in the system for the data owner of the point. When the data owner is determined, the local server automatically creates a cache reference in the local database. This cache reference is known as a “cache point”.

Areas

An area must be configured on every server that accesses it. The configurations must specify the same area code and server alias, and the code for each area must be unique across all servers.

All points assigned to an area must be defined on the server specified in the area's definition.

Any point that is accessed from more than one server must be assigned to an area.

By default, the server subscribes to alarms for all areas. You can unsubscribe to alarms from a remote area by clearing its **Enable Alarms** checkbox on the Areas summary.

For information about how to configure areas, see "Defining and Enabling Areas" on page 92. For information about alarms in a distributed server architecture, see "Notifications" on page 343.

Point IDs

Point IDs must be unique across all servers that share data, to eliminate the need to specify the server when points are referenced (for example during engineering activities). You might want to establish a point naming convention that ensures uniqueness across all servers.

Note If points on two servers have the same point ID, a local server creates a cache point from the first server that responds to its query.

Internal Point Numbers

Point data for a remote point is ultimately accessed by its internal point number on its local server. If a point is deleted and then recreated, its internal point number might change, which means that remote group, trend, and custom displays can no longer access the point. You need to re-enter the point into the remote group, trend, and custom displays that access it. For more information, refer to "Understanding Internal Point Numbers" on page 189.

The cache points are automatically deleted from all remote servers when the point is deleted at the data owner.

In a distributed architecture system, the internal numbering of points and the ordering of points cannot be assumed. The internal point number for a cache point is usually different from the internal point number on the local server, and cache points are created in the order that points are accessed.

Applications that run on a remote server should never use hardcoded point numbers, and custom displays that are called from a remote server should never be created with point repeats.

Point Count Licensing

Cache points do not count against the licensed point count on a server. However, the total of cache points and licensed points on any server cannot exceed 65000.

Distributed Server Displays

Operators interact with local and remote data on displays in the same way. From an operator's perspective, the only difference between a local and a remote point is that a remote point is assigned to an area configured with the alias of a remote server (see "Defining and Enabling Areas" on page 92).

Displays Locations

You can configure the Displays Path in the Station setup files to access displays from any server. This means that you can set Stations in the distributed system to use displays from one central file server or from several local servers, depending on your network and other environmental conditions. For example, in a geographically distributed system, custom displays should be loaded on individual servers.

If displays are on more than one server, you need to ensure that all the appropriate paths are configured in the Station setup files.

Custom Displays

Custom displays engineered on one server can be used on any stations in the system without change, provided they do not use internal database references (for example, user files).

Consolidated Alarm Summary

The Alarm Summary shows a consolidated list of local and remote alarms. The remote alarms displayed to an operator are those from the remote areas for which alarms are enabled on the local server, and which have been assigned to the Station or operator. Local and remote alarms can be filtered in the same way.

You can choose whether alarms are identified on the Alarm Summary by their the area code or by their server abbreviation (for details, see "Configuring "This Server"" on page 352). System alarms from remote servers are always identified by their server abbreviation.

The Station Alarm Zone shows the highest priority unacknowledged alarm, regardless of whether it is a local or remote Alarm.

An operator can navigate directly to the Associated or Point Detail display for a remote alarm, just as for a local alarms.

The “in-alarm” and acknowledgment status of remote Points is indicated on custom displays in the same way as local Points.

Associated Displays

Each Station displays the Associated Display defined on its local server. To ensure that the appropriate Associated Display is displayed for remote points, the numbers and contents of Associated Displays should be the consistent across all servers.

Notifications

Notifications include process alarms, system alarms, messages and journalled events. With the Distributed Server Architecture option, alarms and messages are distributed as needed by the processes running on each server in the system.

Alarms

On each server, you enable alarms from remote servers by configuring the areas for which you want to display alarms and then enabling alarms for those areas. This process is the same as for alarms from the local server.

Operators use the System Configuration - Areas display if they want to identify the server for points that are in alarm.

An alarm is also displayed if a remote server cannot be accessed. See "Performance Considerations" on page 348 for details.

For information about the different effects of disabling alarms for local and remote areas, refer to "Disabling Alarms in a Distributed Server Architecture" on page 343.

System Alarms

If you need to display system alarms for one server on another server, you need to configure Area Code 1 on the server that issues the alarms. This is good practice for all servers that share data.

To configure Area Code 1, you log on to the server that issues the alarms, open the System Configuration - Areas summary, and enter an area code for the System Area at the top of the page. For details, refer to "Defining and Enabling Areas" on page 92.

Disabling Alarms in a Distributed Server Architecture

In a distributed server architecture, the effect of disabling alarms depends on whether they are for points in a local area or a remote area.

Alarms for a Local Area

If you disable alarms for a local area, the alarms are not generated. Subscribing servers receive the alarm message "Notification Area Unavailable *Area Code*".

Alarms for a Remote Area

If you disable alarms for a remote area, the effect is to unsubscribe your local server from the alarms. The remote server continues to generate alarms, and other servers that subscribe to it continue to receive them.

Alarm and Message Acknowledgement Policy

By default, alarm acknowledgements are distributed to all servers. This means that the alarm only needs to be acknowledged once, at any server that displays it. Remote alarms can be acknowledged in the same way as local alarms, from custom displays, the Alarm Summary display, and the Station Alarm Zone.

You can configure the **Alarm Acknowledgement Policy** setting so that alarms must be acknowledged at each server (refer to "Configuring "This Server"" on page 352). This setting must be the same on all servers.

Message acknowledgements are always distributed to all servers.

Alarm Message Index

Each Station displays the message text defined on its local server. To ensure that appropriate messages are displayed for remote points, the alarm message indexes and text should be the same on all servers.

Journalled Events

Because distributing all journalled events would need significant bandwidth, most events are recorded only on the server where the point is defined. The exceptions are Acknowledgement events and Point Value Change events, which are recorded both on the server where they occurred and on the data owner.

This means that the event archive on each server includes all events for its local points, and Acknowledgement events and Point Value Change events that occurred on the local server and affect remote points.

To view events for a remote server:

- The Station can log on to the remote server and view the Event Summary display.
- If sufficient bandwidth is available an ODBC-based report, using the PlantScape ODBC Driver, can be constructed to generate a consolidated event report from multiple servers. The ODBC Driver is included with the PlantScape Open Data Access option.

Journalled Operator Changes

Operator changes to a remote point are journalled on both the local server and the data owner.

History, Trends, and Downtime Analysis

Extended Event Archiving

With two exceptions, events for a point are recorded only on the server where the point is defined. The exceptions are Acknowledgement events and Point Value Change events, which are recorded both on the server where they occurred and on the data owner.

Trends

When a trend includes a remote point, historical data for that point is retrieved from the remote server in real time (see “Configuring Servers to Share Data” on page 352). If the history intervals on local and remote servers are configured differently, trends may not display all the requested data. For example, a local server is configured to collect fast history at 1 second intervals and a remote server is configured to collect fast history at 5 second intervals. If you create a trend on the local server requesting data from the remote server at 1 second intervals, data from the remote server is not displayed in the trend on the local server.

It is not possible to collect history locally for a remote point. Therefore a remote point should never be assigned to history.

Downtime Analysis

The Downtime Summary does not show information for remote points.

Security

If you are using Station-based security, you assign both local and remote areas to the Stations on their local servers. You cannot use a remote server to assign any areas to Stations. (For information about Station-based security, see “Assigning Areas to Stations” on page 222.)

If you are using operator-based security, you configure the operators on all servers where they need to log on. You then assign both local and remote areas to the operators on their local servers. You cannot use a remote server to assign any areas to operators. (For information about operator-based security, see “Assigning Areas to Operators” on page 222.)

Areas are used to restrict Access to both local and remote Server data.

If you are using point control levels, the control level is passed to the remote server and checked at the remote Server.

Working with a Distributed Server Architecture

For normal operation, a distributed server system works the same as a single server system. From an operator's perspective, the only difference between a local and a remote point is that a remote point is assigned to an area configured with the alias of a remote server (see "Defining and Enabling Areas" on page 92).

This section discusses the characteristics of a distributed server system for engineering tasks.

Working with Algorithms

Point Algorithm displays use internal database references. This means that you need to log on to the remote server, using standard Operator Station networking facilities, to view point algorithm configuration from Station.

Configuring Hardware Items

The configuration summaries for hardware items only show items configured on the local server. You need to log on to the remote server to view or work with the configuration of the following items:

- Connections
- Channels
- Controllers
- Printers
- Redundant Servers
- Stations
- System Status displays

Performance Considerations

The accuracy of information and timeliness of control for remote servers depends on the capacity and reliability of the networks and data links.

A local server issues an alarm if the response from a remote server takes longer than the time specified in its configuration (see "Configuring the Remote Servers" on page 353). Operators can also monitor the status of links and remote servers from the System Configuration - Distributed Servers summary. Clicking a server in the summary list displays more detailed status information.

Accessing history data for remote points in real time might impact the overall performance of a low bandwidth network, such as a WAN. For example, history data trend displays is requested and returned in real time.

Multicasting

For any server in the distributed architecture, you can choose multicasting to remote servers that are connected over a network that supports it. The performance effects of multicasting depend on the network and the number of servers. Contact your local Honeywell representative for information about the network devices that support multicasting, and its appropriateness for your system.

When multicasting is used, a server sends a single copy of its data over the network to other servers. The other servers on the network need to know the network address and port number the multicast packets use so that the networking software can listen for data on that address. The benefit of multicasting is to conserve bandwidth and reduce network traffic.

Some routers are not configured with multicasting enabled. In this situation multicasting must be manually enabled on the router.

PlantScape uses multicasting to provide the status of both the server and the links between servers in a distributed server architecture. Each server has a link daemon which multicasts its status to the network. Daemons on the other servers listen for these multicasts to obtain the status of other servers.

Synchronization Considerations

To share alarms and historical data, the servers need to be time synchronized. However, the servers can be in different time zones, each showing its own local time.

For information about how to synchronize servers, refer to “Re-Synchronizing the Date and Time on the Servers” on page 315.

Server Redundancy and Networks

No special configuration is required for Distributed Server Architecture on redundant server systems or dual network systems. The Distributed Server status summary and status tabs show the redundancy architecture of each server.

Operator Keyboard Support

Specialized operator keyboard functions, such as AUTO/MANUAL and raise/lower, are supported in the same way for local and remote points.

The fast raise/lower step is specified in the system wide station configuration for the server that the Station is connected to (see “Configuring Alarms” on page 68). This step applies to local and remote points.

Internationalization

All servers in the distributed server architecture must be in the same language.

Configuration for Distributed Server Architecture

The Distributed Server Architecture option is enabled on each server by configuring the network names of the servers to be accessed (see "Configuring Servers to Share Data" on page 352). The subset of data to be accessed from each remote server is specified by including the required remote areas in the areas configuration (see"Alarms" on page 343 and "Defining and Enabling Areas" on page 92).

The following steps are required to configure each server to access the other servers:

1. Enter configurations for all servers that the server will need to access (see "Configuring Servers to Share Data" on page 352).
2. Define all areas, including those on remote servers, that the server will need to access.
3. Ensure the paths of any custom display files and numbered display files are added to the Connections Properties for stations connected to the server (see "Displays Tab" on page 70).

   Note On any server, remote points only appear in the Display Builder properties point list after the server has accessed them and identified their host servers. The remote point references are resolved at runtime.
4. Copy all user-defined acronyms used by the custom display files to the server, using **fildmp** (for details, refer to the *Application Development Guide*).
5. If Station-based security is being used, assign the remote areas that each Station needs to access (see "Assigning Areas to Stations" on page 222).
6. If operator-based security is being used, assign the remote areas that each operator needs to access (see "Assigning Areas to Operators" on page 222).
7. Assign the remote areas for any custom displays copied from remote servers in Step 3 (for information about assigning areas to custom displays, refer to the *Display Building Guide*).

Note On the Station Area Assignment display, the Operator Area Assignment display, and all operator displays, remote areas look the same as local areas. To identify that an area is remote, you need to check the server alias specified in the area's configuration (see "Alarms" on page 343).

Configuring Servers to Share Data

On each server that will access or be accessed by other servers in the system, you need to configure some parameters and define the other servers.

Configuring "This Server"

The local server is shown as This Server at the top of the Distributed Servers summary. To configure it for access by other servers:

1 On the System Configuration Menu display click **Distributed Servers**. The Distributed Servers Configuration summary opens.

2 Click the link flagged as **This Server**. The Distributed Server Local Configuration display opens.

3 Complete the fields on the Configuration tab:

Property	***Description***
Server Alias	The label remote servers use for this server. The alias is broadcast to all servers in the network, and appears on the Areas Summary display.
Abbreviation	The abbreviation remote servers use for this server on the alarm summary. The abbreviation is broadcast to all servers in the network.

4 Click the Alarm Settings tab and select the required settings on the tab:

Property	***Description***
Alarm Identification	How the location of alarms is displayed in the Alarm Summary on this server. The options are area code (default) or server abbreviation.
Alarm Timezone Adjustment	Whether to show this server's local time or the remote server's local time for remote alarms.
Alarm Acknowledgement Policy	How alarms must be acknowledged. The options are: • System-wide acknowledgement; One acknowledgement applies to all servers in the system • Local acknowledgement; Alarms must be acknowledged on every server in the system The setting must be the same on all servers.

Property	*Description*
Distributed Server Alarm Priorities	The priority and subpriority of alarms for the functioning of Distributed Server itself. You can set priorities for the following alarms: • Primary Link Fail • Backup Link Fail • Notification Area Unavailable • Notification Connection Fail • Connection Overload

Configuring the Remote Servers

You need to configure all remote servers that This Server will need to access. To configure a remote server:

1. On the System Configuration Menu display, click **Distributed Servers**. The Distributed Servers Configuration Summary opens.
2. Click an empty row in the server list. The Distributed Server Configuration tab opens.
3. Enter the **Network name** of the server (see "Network Configuration Requirements" on page 303). For a redundant server or redundant network system, use the server base name.

   For information about configuring the hosts files in a distributed server system, see the *Installation Guide*.

   The **Alias** and **Abbreviation** of the remote server are supplied automatically. Any change to the network name on this tab is reflected in the Alias and Abbreviation fields on the tab, until the broadcast alias and abbreviation are received from the remote server.
4. Select the appropriate options to specify the server architecture. The options are:
   - Server connected via dual network.
   - Server is a redundant pair.
5. Specify overload alarm settings for the data and notification connections.
6. Specify whether the network connection to the server supports multicast traffic.

Distributed Server Tuning

The Tuning tab contains Cache and Communications Settings for the remote server. These settings should only be changed by experienced technical personnel in consultation with your local Technical Assistance Center.

To set tuning settings:

1. On the System Configuration Menu display, click **Distributed Servers**. The Distributed Servers Configuration Summary opens.
2. Click the server alias name. The Distributed Server Configuration tab opens.
3. Click the Tuning tab.

   You can tune the following settings for individual connections to publishing servers:

Property	***Description***
Cache flush time	The intervals (in milliseconds) that the subscription list is checked for references to old data. The default value is 60 seconds.
Cache age time	The amount of time (in milliseconds) old data remains in the dynamic cache. The default value is 10 minutes.
Maximum subscription time	The slowest subscription time (in milliseconds). The default value is 10 seconds. If the subscription time is slower than that specified, the subscribing server switches from subscription to synchronous read (polls). Maintaining a slow subscription is not efficient.
List fragment size	The size of data packets sent over the network. The default is 100 parameter values. This is tuned for optimal performance on low bandwidth links.
Connection timeout	The amount of time (in seconds) a packet of data can remain on the network without being acknowledged. When the timeout period expires, the connection is broken and communication is initiated again.
Notification buffer interval	The maximum amount of time (in seconds) a notification can be delayed on the publishing server before being sent to the subscribing server. The default value is 2 seconds
Notification keep alive interval	The maximum amount of time (in seconds) the publishing server does not send packets to the subscribing server. If there are no notifications within this time, an empty keep alive packet is sent to the subscribing server. The default value is 15 seconds.

The maximum tuning settings for each remote server are set by the global cache age time. The cache flush time is calculated first. The cache flush time is then used to calculate the cache age time. The cache age time is then used to calculate the maximum subscription time. These calculations are as follows:

Tuning Setting	***Minimum Value***	***Maximum Value***
Cache Flush Time	10000ms.	(Global Cache Age Time)/4
Cache Age Time	Cache flush time	Global Cache Age Time - (2 * Cache Flush Time)
Maximum Subscription Time	100ms	Cache Age Time

To tune the global cache settings:

1. On the System Configuration Menu display click **Distributed Servers**. The Distributed Servers Configuration summary opens.
2. Click the link flagged as **This Server**. The Distributed Server Local Configuration display opens.
3. Click the Tuning tab.

   You can tune the following global cache settings to apply to all distributed architecture connections on the subscribing server.

Property	***Description***
Cache Age Time	Sets the maximum limits (in milliseconds) for the tuning settings for each remote server this server will access. The default is 1 hour. (Also referred to as global cache age time.)
Read Data Valid Time	The amount of time (in milliseconds) that data remains valid. When this time expires, the values are read again from the publishing server. This value is independent of the subscription time. The default value is 10 seconds.

16 Configuring Schedules

This chapter describes how you configure:

- Holidays
- Shifts
- Point control schedules

About the Schedules Option

The Schedules option enables the control of points to be scheduled on both a one-off and periodic basis. For example, a pump could be scheduled to be switched on at 4 pm and off at 6 pm each day.

Schedules are configured using Station displays. The following attributes can be configured for each schedule:

- The time and date of the point control
- The point and point parameter to be controlled
- The value to control the point parameter to
- The schedule action

The schedule action can be one-shot, daily, work day, weekend, holiday, or a day of the week.

The number of schedules that can be configured is based on database sizing (see the *Installation Guide* for details.)

Configuration information that is related to the scheduling option is the configuration of holidays and shifts. Holiday and Shift configuration displays are part of a standard PlantScape system and are described in the following topics.

Configuring Holiday and Shift Details

Holiday and shift information is used in the scheduling of point control. Shift information can also be used in:

- Periodic Reports (see "How Reports Are Used" on page 242 for details)
- Algorithms (see "Configuring Algorithms" on page 193 for details)

You use Station displays to configure holidays and shifts. To configure holidays or shifts you need to be using a security level of SUPV or higher.

Configuring Holidays

You can use the Holiday Configuration display to configure the dates of up to 30 holidays.

To call up the Holiday Configuration display, either:

- Select **Configure** ⇒ **Schedules** ⇒ **Holidays** on the System menu bar
- On the System Configuration Menu display, click **Holidays**.

To add a new holiday:

- Type the date in the format DD-MMM-YY (for example, type **`11-APR-99`** for the 11th of April 1999).

To delete a holiday:

- In the data field, **`NOW`** or enter spaces so that the field is blank.

Configuring Shifts

Use the Shift Configuration display to configure the start time and length of shifts at your site.

To call up the Shift Configuration display, either:

- Select **Configure** ⇒ **Schedules** ⇒ **Shifts** on the System menu bar
- On the System Configuration Menu display, click **Shifts**. This opens the Shift Configuration.

To define shifts:

1. Type a time in the **Start of Day** field in the format HH:MM. (Start of day is the time since midnight on a 24 hour clock.)
2. Type a period in the **Length of Shift** field in the format HH:MM.

These shift boundary values are also used for algorithms and reports, as well as for schedules.

Configuring Point Control Schedules

To configure schedules, you need to be using a security level of SUPV or higher. You configure schedules from the Point Control Schedule display.

To call up the Point Control Schedule display:

- Select **Configure** ⇒ **Schedules** ⇒ **Point Control Schedules** on the System menu bar
- On the System Configuration Menu display, click **Point Control Schedules**. This opens the Point Control Schedule display.

The Point Control Schedule display is divided into two sections. The top part of the display shows a list of currently configured schedules. The **Schedule Maintenance** fields at the bottom of the display are used for adding, deleting, or updating schedules.

Each schedule displays the following fields:

Date

The date that the schedule will be performed.

Time

The time that the schedule will be performed.

Point ID

The point ID of the point that will be controlled by the schedule.

Parameter

The point parameter of the point that will be controlled by the schedule, usually the OP (output).

For analog points, the SP, OP, MD, A1 - A4 parameters can be controlled.

For status points, the OP and MD parameters can be controlled.

You cannot schedule the control of a PV point parameter.

For flexible points, any writable numeric parameter can be controlled.

Target

The value that the point parameter will be controlled to.

For analog points:

- The target value of the SP and OP parameters can be set to any value between the SP and OP control limits respectively.
- The MD parameter can be set to any value between 0 to 15 (where 0 is manual, 1 is auto, and so on)

For more information about analog point parameters, see “Analog Point Parameters” on page 126.

For status points:

- The target value for an OP parameter can be set to 0 or 1 for single-bit output points and 0-3 for dual-bit output points.
- The MD parameter can be set to any value between 0 to 15 (where 0 is manual, 1 is auto, and so on).

For more information about status point parameters, see "Status Point Parameters" on page 123.

For flexible points, any writable numeric parameter can be controlled. You need to know the numeric value for enumeration parameters (such as Digital States or Nodes). For more information about flexible points, see "Point Types" on page 118 and the documentation for the device.

Type

The type of schedule action:

Type	***Description***
One-shot	The control will be performed when the scheduled date and time becomes equal to the current date and time, then deleted.
Daily	The control will be performed when the scheduled date and time becomes equal to the current date and time. It is then re-scheduled for the following day at the same time.
Work day	The control will be performed when the scheduled date and time becomes equal to the current date and time, if that is between Monday and Friday inclusive and the day has not been defined as a holiday. The control is then re-scheduled for the following day at the same time to check for a work day condition.
Weekend	The control will be performed when the scheduled date and time becomes equal to the current date and time, if that is a Saturday or a Sunday. The control is then re-scheduled for the following day at the same time to check for a weekend condition.
Holiday	The control will be performed when the scheduled date and time becomes equal to the current date and time if the day has been defined as a holiday (see "Configuring Holiday and Shift Details" on page 359). The control is then re-scheduled for the following day at the same time to check for a holiday condition.
Monday Tuesday Wednesday (and so on through to) Sunday	The control will be performed when the scheduled date and time become equal to the current date time if it is the configured day of the week. The control is then re-scheduled for the following day at the same time to check for the specified day.

Considerations When Adding a Schedule

The Scheduler runs once per minute to check if any scheduled controls should be performed. Controls are performed sequentially. Therefore, if a large number of schedules are configured for the same time, the last control requests might be delayed by several tens of seconds. However, these requests will always be performed before performing controls scheduled at a later time. It is recommended that you schedule a large number of schedules over a short period of time rather than all at the same time, in order to reduce system loading.

Selecting a Schedule

All schedule modifications are made on the Point Control Schedule.

You can type information directly into the fields under **Schedule Maintenance**, or you can click an existing schedule in the display to copy the details into the Schedule Maintenance fields before amending them. When the information is correct, click Insert if it is a new schedule, or **Update** to change the schedule you selected.

Adding a Schedule

Use the Point Control Schedule display to add a new schedule as follows:

1. Under **Schedule Maintenance**, enter the **Date**, **Time** (HH:MM), **Point ID**, **Parameter** (choose from the list), **Target** and **Type** of schedule (choose from the list.)

   For example, to schedule the control of the OP parameter of point FIC123 to 20.0 at 10 AM every day starting from today (12 February 1997) enter:

   `Date: 12-Feb-97; Time: 10:00; point ID: FIC123; point parameter: OP; Target: 20.0; Action: DAILY`

   Alternatively, a similar existing schedule can be copied to the Schedule Maintenance fields by clicking an existing schedule. The schedule can then be modified to suit.
2. When you have added all the schedule details, click **Insert** to add the schedule.

Note

- You cannot enter more than one schedule with the same point, date, and time. If you need to control more than one parameter, for example to set a point to manual before setting its value, enter the schedules for each parameter in sequence, a minute apart.

Deleting a Schedule

Use the Point Control Schedule display to delete a new schedule as follows:

1. Specify the schedule you want to delete by clicking it in the display.
2. When the schedule you want to delete is displayed in the **Schedule Maintenance** fields, press **Delete**.

Updating or Copying a Schedule

Use the Point Control Schedule display to update a schedule as follows:

1. Specify the schedule you want to update or copy by clicking it.
2. When the schedule you want to change is displayed in the **Schedule Maintenance** fields, make your modifications in the appropriate fields.
3. Press the **Update** button.

Tip *When updating a schedule, click the schedule you want to update (rather than manually typing in the information in the Schedule Maintenance fields).*

Event Log Entries for Schedules

PlantScape logs an event for every:

- Insertion, deletion, and update of a point control schedule
- Command executed by a point control schedule

17 Configuring Recipes

This chapter describes how you configure recipes.

A “recipe” is a set of pre-configured values that can be loaded into one or more sets of point parameters. A set of point parameters generally controls a “unit”, which is a set of equipment used to produce the recipe. A recipe can be loaded into any units that share similar sets of points.

Recipes can consist of up to 30 ingredients. If more than 30 ingredients are required, you can chain individual recipes together to form a larger recipe.

The Recipe Manager feature in PlantScape is designed as a simple way of downloading values to multiple point parameters. If a full batching system is required, Total Plant Batch should be used.

About Recipe Configuration

The total number of recipes that can be configured depends on the size of your database. For details of database sizing, see the Installation Guide.

For each recipe, the following attributes can be configured:

- Recipe title
- Scale factor for recipe ingredients (This can be specified by an operator.)
- Descriptors of the units to be loaded with the recipe (This can be specified by an operator.)
- Up to 30 ingredients (If more than 30 ingredients are required, you can chain recipes together.)

For each ingredient, the following attributes can be configured:

- Partial ID of the point to be loaded (leaving out the 2-character unit prefix)
- Parameter into which the value is to be loaded (usually a set point)
- Description of the ingredient of action that it represents
- Master value - the usual value that is loaded
- Maximum value - the maximum value that can be loaded
- Minimum value - the minimum value that can be loaded
- Working value - the actual value to be loaded (can be specified by an operator)
- Whether or not the value is scaled

After a recipe has been configured, operators can start the process by "loading" the recipe. For details, see the Operators Guide.

You can use custom displays to monitor the progress of a loaded recipe. Custom displays can show the point parameter values that are used to control the production. For details on how to build custom displays, see the Display Building Guide.

To configure recipes, you need to be using Station at a security level of SUPV or higher. (Security levels are described in "Configuring Security and Access" on page 209.)

Configuring Points for Recipes

If a point will be in a recipe, the first two characters of the point ID must be the unit descriptor. The unit descriptor is a 2-character identifier (for example 01, L7).

You need to configure a point for every combination of unit descriptor and ingredient that you want to use. For example, if two units ("01" and "02") are to be used with a recipe that contains the ingredient `WATER`, the points `01WATER` and `02WATER` need to be configured.

You can also configure an analog point with the name *uu*`RECIPE`, where *uu* is the unit descriptor. Whenever a recipe is run, *uu*`RECIPE`'s SP and description are updated to reflect the recipe's number and name respectively.

Note For some controllers, you need to set the mode of points in the controller to allow control by programs such as recipes. For example, the mode attribute (MODEATTR) for PID blocks in the Honeywell Hybrid Controller must be set to Program to allow control by recipes.

When the operator loads a recipe, PlantScape determines the point ID to be loaded by combining the unit descriptor defined for the recipe with the partial point IDs defined for each ingredient. The following figure shows how the unit descriptor and points in the recipe are used.

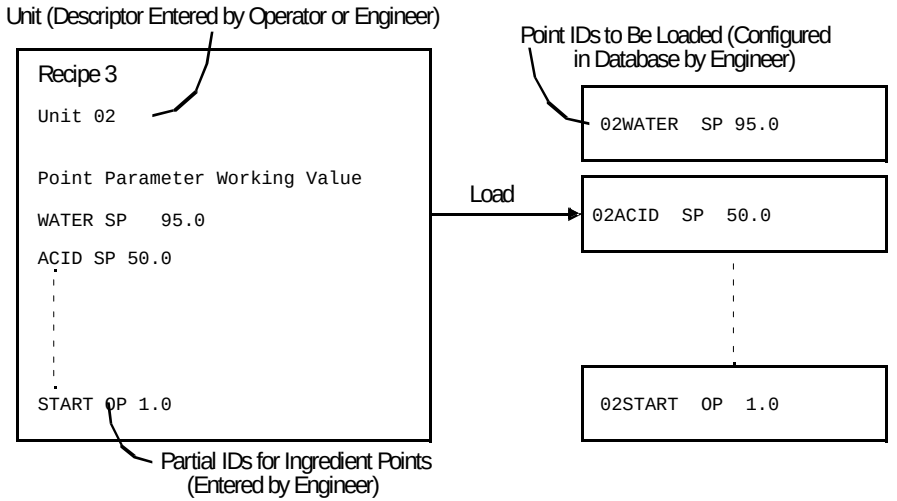

Unit (Descriptor Entered by Operator or Engineer)
Point IDs to Be Loaded (Configured in Database by Engineer)
Recipe 3
Unit 02
Point Parameter Working Value
WATER SP 95.0
ACID SP 50.0
START OP 1.0
Load
02WATER SP 95.0
02ACID SP 50.0
02START OP 1.0
Partial IDs for Ingredient Points (Entered by Engineer)

Figure 17.1 How Points Are Used with Recipes

Configuring Recipes

To configure a recipe:

1 Select **Configure ⇒ Applications ⇒ Recipes** from the System menu bar. This calls up the Recipe Summary display.

2 To work with an existing recipe, click its number or title. This calls up the Recipe Detail display.

3 To create a new recipe, click an unassigned row. When the blank Recipe Detail display opens, enter the appropriate information. (See "Defining a Recipe" on page 368.)

Defining a Recipe

To configure a recipe, you define the recipe itself in the fields at the top of the Recipe Detail display, and define up to 30 ingredients in the fields in the bottom part of the screen (refer to "Defining the Ingredients of the Recipe" on page 369).

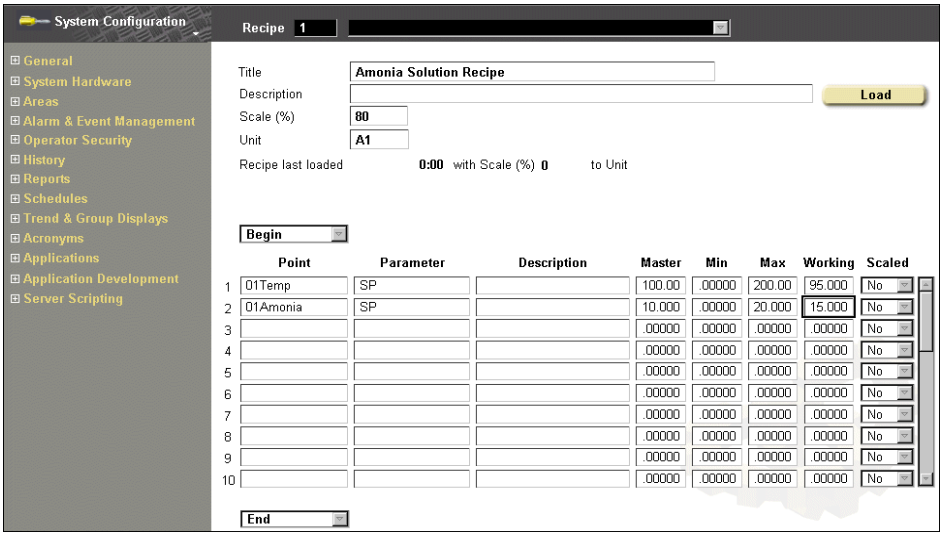


Figure 17.2 Recipe Detail Display

The fields that define the recipe are:

Title The title that appears on the Recipe Summary display.

Description	A fuller description of the recipe than can be displayed in the title.
Scale	The scale factor for the recipe. Ingredients in a recipe can be scaled to less than 100% so that a partial recipe quantity can be produced. When the recipe is loaded, all ingredients with **Scaled** set to "Yes" are scaled by the percentage specified in this field. This percentage can be changed by anyone using the OPER security level or higher.
Unit	The descriptor of a unit to which the recipe can be loaded.

Defining the Ingredients of the Recipe

You can define up to 30 ingredients in a recipe. If there are more than 30 ingredients, you need to divide the process into 2 or more recipes and chain them together (see "Chaining Recipes" on page 370).

The fields that define the recipe are:

Point	The last 14 characters of the point ID to be loaded (the first two characters are taken from the unit descriptor).
Parameter	The point parameter to be loaded.
Description	A description of the ingredient. This description will be used in custom reports.
Master	The usual value for the ingredient. This value is for operator information.
Minimum	The minimum value for the ingredient. The recipe will not be loaded if the operator enters a working value that is less than this value.
Maximum	The maximum value for the ingredient. The recipe will not be loaded if the operator enters a working value that is greater than this value.
Working	The value to be loaded. If the Scaled field for this ingredient is set to "Yes", this value will be scaled by the percentage specified in the Scale field for the recipe. This field can be changed by anyone using the OPER security level.

Scaled	Enter “Yes” if the working value should be scaled by the Scale percentage. Otherwise enter “No.”
Begin/Continue/End Comboboxes	If the recipe consists of 30 ingredients or less, set the combobox above the list of ingredients to BEGIN and the combobox at the bottom of the display to END. See Chaining Recipes for details on using the **Continue** option.

Chaining Recipes

If more than 30 ingredients are required in a recipe, you need to divide the process into 2 or more recipes, which you enter in sequence and chain together.

For example, if you need to chain two recipes:

- In Recipe 1, select BEGIN in the top combobox, and select CONTINUED in the bottom combobox.
- In Recipe 2, select CONTINUED in the top combobox, and select END in the bottom combobox.

Only an individual with a security level of SUPV or higher can chain recipes.

Configuring Custom Reports

You can set up free format custom reports to show the results of completed processes.

The following sections describe how you set up custom reports to run automatically, and how you configure a free format report for recipes.

Running Custom Reports Automatically

To configure a report to run automatically at the end of a process, you define a digital value in a controller that changes state at the end of the process:

- Configure a status point to scan the digital value from the controller that indicates the end of the process. For details about configuring points, see "Main Properties" on page 120.
- Configure the Status Change Report Request Algorithm with this point so that the required report will be run when the digital value changes to a nominated state. For details about how to configure algorithms, see "Configuring Algorithms" on page 193.

Configuring a Free Format Report

Free Format reports can include point values, calculated values, point history and values from server database files. This section describes how to include information from the server database file that is used to hold recipe configuration. The procedures for configuring Free Format reports are described in "Configuring Free Format Reports" on page 270.

All recipe configurations are stored in one server database file called the Recipe table. Each record in this file contains the configuration for a single recipe. For example, record number 3 holds the configuration for recipe number 3.

Each record in the Recipe table is divided into fields. Each field holds an item of recipe configuration. For example, one field is used to hold the scale factor. Table 17.1, "Recipe Table Field Details," on page 372 shows details about the fields in each Recipe table record.

To read data from a field in the Recipe table, you specify:

- The file number of the Recipe table file. This number is 146.
- The Recipe number
- The starting location of the field, as specified in the Word Offset column
- The data type of the field, as specified in the Data Type column

For a Free Format report, you use the Read from File statement (see "R (Read From File)" on page 291) with the following parameters:

- No = 146 (the file number of the Recipe table file)
- Rec_No = recipe number
- Offset = word offset of field
- Print_Format = a format descriptor (for details of the available descriptors, see "F (Fetch From Point)" on page 283)
- Type = data type of the field

Example To read the scale field (word offset 117) from recipe no. 3 into Free Format variable no 999, the Free Format report entry would be:

```
R 999 146   3     117   I3     I2
```

Word Offset	*Field Description*	*Data Type*
1	Recipe title	A70
106 Bit 15	Chained to previous recipe (1=chained)	I15.1
106 Bit 14	Chained to next recipe (1=chained)	I14.1
107	Scale (0-100)	I2
108	Unit	A2
114	Day of last load	I2
115	Time of last load	RL
117	Scale of last load	I2
118	Unit of last load	A2
125	Ingredient 1 point ID (repeated for the 30 ingredients at an increment of 19 i.e. word 143 for ingredient 2)	A14
695	Ingredient 1 description (repeated for the 30 ingredients at an increment of 20 i.e. word 715 for ingredient 2)	A20
1295 Bit 0	Ingredient 1 scaled (1=scaled) (repeated for the 30 ingredients i.e. word 1295 bit 1 for ingredient 2)	I0.1
1297	Ingredient 1 master value (repeated for the 30 ingredients i.e word 1299 for ingredient 2)	RL

Table 17.1 Recipe Table Field Details

Word Offset	***Field Description***	***Data Type***
1357	Ingredient 1 minimum value (repeated for the 30 ingredients i.e word 1359 for ingredient 2)	RL
1417	Ingredient 1 maximum value (repeated for the 30 ingredients i.e word 1419 for ingredient 2)	RL
1477	Ingredient 1 working value (repeated for the 30 ingredients i.e. word 1479 for ingredient 2)	RL
1537	Ingredient 1 parameter (repeated for the 30 ingredients i.e word 1573 for ingredient 2)	A72

Table 17.1 Recipe Table Field Details (Continued)

18 Configuring Downtime Analysis

This chapter describes how you configure the Downtime Analysis option to record and analyze plant downtime.

Discrete values from controllers can be configured to be delay states. Each delay state can be configured to have an associated category and reason code. These codes are then displayed on the Downtime Summary display on Station when delays occur.

In addition to viewing information on plant delays by calling up this Station display, you can generate a Downtime Analysis report to search and sort data on downtime.

Note You cannot configure Downtime Analysis for CDA points.

You could configure Downtime Analysis for a status point whose PV source references a CDA point, but this is inefficient and might significantly degrade system performance.

About Downtime Analysis

When an item of plant equipment goes into "delay," an entry is made in a file in the server database called the delay file. Each delay entry includes:

- A description of the item of equipment
- The start time and date of the delay
- A downtime category code
- A downtime reason code

Operators are alerted to delays by the yellow flashing **Delay** field in Status Line. They can then view details of the delay and acknowledge this event by calling up the Downtime Summary display.

When the item of equipment returns to normal, the delay is time-stamped as completed. When completed delays are acknowledged, they are removed from the Downtime Summary display. Delays that are acknowledged before they are completed are removed automatically when the delay is eventually completed.

To call up the Downtime Summary, go to the System Menu display and choose **Downtime**.

The number of delays that can be shown on the Downtime Summary is based on database sizing. For information about database sizing, see the Installation Guide.

Using Summation to Analyze Downtime

Downtime can also be analyzed by summarizing downtimes by area, downtime category, and delay state. Downtime can be summarized for the last hour, day, shift, week, month, quarter, or year.

These totals are stored in analog points in the database and are available for reporting (see "Configuring Downtime Summation" on page 380).

Configuring the Recording of Downtime

To configure downtime analysis, you need to:

1. Configure status points to read values from controllers that indicate delay conditions of plant equipment.
2. Configure reason codes for delays. (Reason codes are used to provide a short description of the cause of the delay.)
3. Configure reason categories for delays. (Reason categories are used to help classify delays.)

Configuring Points for Downtime

Each state of the status point can be configured to indicate a "delay state." When the status point changes to a nominated delay state, a new delay is generated in the delay file and is available for display on a Station.

To configure a status point to "generate delays":

1. Configure a status point that reads a value from a controller that indicates a delay condition (or conditions). Multi-bit status points can be used. For example a 3-bit status point could be used to generate up to eight different delay states.
2. Configure this status point with the downtime analysis algorithm (number 65). This algorithm allows states of the status point to be nominated as delay states. A default reason code and category code can be configured for each delay state.

For details about how to configure points, see "Main Properties" on page 120. For details about how to configure algorithms, see "Configuring Algorithms" on page 193.

For details about how to configure categories and reasons, see "Configuring Downtime Reasons" on page 377 and "Configuring Downtime Categories" on page 378.

Configuring Downtime Reasons

When you configure a delay point, you can assign a reason code to each delay state. This helps to identify the causes of the delay, and assists in the analysis of downtime.

You can configure up to 1024 reason codes by specifying a different description for each reason code you want to use.

The description you enter for each reason code is displayed on the Downtime summary for a delay point that uses that reason code. Note, however, that operators can enter a new reason code for a delay in the Downtime Summary. This might be necessary, if, for example, the default reason turns out not to be the actual reason for the downtime.

To configure reason codes, you need to be using Station at a security level of SUPV (or higher).

To call up the Downtime Reasons Configuration on a Station:

1. Select **Configure** ⇒ **Applications** ⇒ **Downtime**, the Downtime Configuration display opens.
2. Click the **Reasons** tab.
3. Enter the reason description text (up to 25 characters) in the **Description** field next to the reason code you want to use.

Configuring Downtime Categories

When you configure a delay point, you can assign a category code to each delay state. This helps to classify and analyze downtime.

Category codes are two-character alphanumeric codes that are displayed on the Downtime Summary display with the delay. (Note, however, that operators can enter a new category code for a delay in the Downtime Summary.)

To configure category codes, you need to be using Station at a security level of SUPV (or higher).

To call up the System Configuration–Downtime Categories tab (Table 18.1, “,” on page 379):

1. Select **Configure** ⇒ **Applications** ⇒ **Downtime**, the Downtime Configuration display opens.
2. Click the **Categories** tab.
3. Enter a 2-character code. An optional category description of up to 10 characters can be entered for each category in the **Description** field to help clarify the category code.

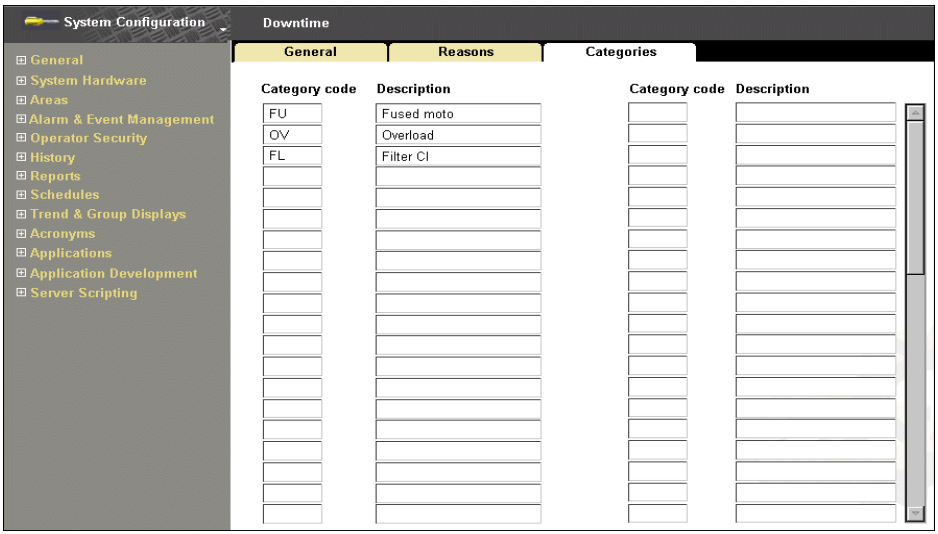


Figure 18.1 System Configuration–Downtime Categories Tab

Configuring Downtime Summation

Downtime can be totalled by area, category, and delay point status at specified intervals. The totalled delay information is stored in the PV of dummy analog points.

To define a dummy analog point for downtime summation, you define the point in Quick Builder:

- Leaving the source and destination addresses for PV, SP, OP, and MD blank
- Using a particular naming convention.

The naming convention for downtime summation points is:

```
aaCccDdd
```

where:

aa	Area code of the delay points. This code must be for a configured area (see "Using Areas to Control Access to the System" on page 222).
cc	Category code of the delays
dd	Delay state of the delay point (00 to 07)

To configure downtime summation periods, you need to be using Station at a security level of SUPV (or higher).

1. Select **Configure** ⇒ **Applications** ⇒ **Downtime**, the Downtime Configuration display opens.
2. click the General tab.
3. Select a frequency from the **Summation Point update frequency** drop-down list. (The default is to have the summation of downtime disabled.)

Configuring the Downtime Analysis Report

The Downtime Analysis Report can include delays that are still outstanding as well as those that have been resolved. The report output can also be sorted by downtime category and reason codes.

Details on creating a Downtime Report can be found under “Configuring a New Report” on page 243 and in “Downtime Analysis Reports” on page 254.

19 Configuring Extended Event Archiving

Every event, such as a point status change or an operator action, is stored in an event file. The online event file is only capable of storing a certain number of events. You can archive these events to disk and tape, where they can be stored for future retrieval.

This chapter describes:

- What Extended Event Archiving is, and how it works
- How to configure Extended Event Archiving

About Extended Event Archiving

You use the Extended Event Archiving and Reporting System to enable extended event collection and recall.

When extended events collection is enabled, PlantScape periodically copies the events from the event file and places them into the Online Extended Event file for queries and reporting. When the Online Extended Event file becomes full, it is copied into an archive folder and an alarm is generated to alert the operator to save the archived file to backup tape.

The contents of the tape are verified automatically when the backup is complete. The status (success or failure) of the backup is logged in the Event Summary, and the operator is notified with a message.

If necessary, you can also perform an early backup (that is, before the event file becomes full and an alarm is raised). You can restore an archive of events from tape at any time, and standard PlantScape reports can be used to access this information.

The reporting capability of Extended Event Archiving and Reporting allows you to run alarm and event reports from an individual archive restored from tape.

Tape Drives for Archiving

Extended Event Archiving uses Windows Backup to save and restore events to and from tape. Therefore, any device supported by Windows Backup can be used for PlantScape backups.

For details about configuring a suitable tape device, see the Microsoft Windows documentation. For more information about backing up PlantScape, see the Administration and Startup Guide.

Extended Event Archiving System Configuration

To configure Extended Event Archiving:

1 On the System Configuration Menu display click **Extended Event Archiving**. This calls up the Extended Event Archiving Configuration display.

2 You use the fields and settings in the Extended Event Archiving Configuration display as follows:

Property	***Description***
Extended Event Collection (Enable/Disable)	Use this button to switch event collection on or off. If collection is disabled, events occurring until it is re-enabled are not stored in the extended event file.
Extended Event Archiving Status	The status of the archiving system can be either OK, Overload, Failed, Full Disk, or Copy Mode. For a description of each status, see Table 19.1, "Extended Event Archiving Status," on page 389.
Extended Event Archiving Alarms Priority	This defines the priority of the alarm that will be generated by the extended event archiving system.
Extended Event Cycle Period (seconds)	The cycle period defines how often events are copied from the event file by the archiving system into the online extended event file. The default value is 300 seconds (5 minutes).

Property	*Description*
Extended Event Throttle Value	The maximum number of events that can be copied into the online extended event file over the duration of a cycle period. When the number of events generated per cycle period is greater than the throttle value, typically in peak traffic periods, the system goes into the overload state. The system will only process the number of events specified in the throttle value over each collection cycle period, so a backlog may occur. When the number of events being generated decreases, the system catches up by processing this backlog. The reason for keeping the throttle value to a minimum is to ensure the system does not take up too much of the server's time performing archiving functions instead of normal functions. The default throttle value is 500. With the default cycle period, this allows for a continuous average of more than one event every second, which meets most applications. You can increase the throttle value if your system generates events at a higher continuous average rate. You should not lower the throttle value. If set to zero, all events generated since the last extended event archive took place are moved into the online extended event file at the end of the extended event cycle period.
Number Of Records In Online Extended Event File	The size of the online extended event file to be stored on the hard drive. 100,000 events will take up approximately 60 Mb of hard disk space. This includes: 20 Mb for the online file 20 Mb for the archive file 20 Mb for the playback file It is recommended that you allow an extra 20% of hard disk space for normal operation of the archiving system. For example, if your system needs to cater for up to 500,000 events, then the hard disk space required is: Space required for event storage: (500,000 / 100,000) * 60 Mb = 300 Mb Space for normal operation of the archiving system: 20% * 300 Mb = 60 Mb Total hard disk space required = 300 Mb + 60 Mb = 360 Mb Caution: If the system runs out of disk space to store the archived files, your archive data may not be correctly saved.

Property	***Description***
Next Record Number In Online Extended Event File	This specifies the record number in the online extended event file where the next event collected from the system will be placed.
Current Push Record	The current push record indicates the record number in the system file of the most recent event that has occurred. Compare this value to the last event collected to show how many events are yet to be read into the online extended event file. The current push record will wrap around to zero once it reaches the maximum number of events. It is a system value and is not configurable.
Maximum Standard Events	The maximum number of events that can be stored in the system file. This number is generated when the system is ordered, and is not configurable.
Last Standard Event Collected	The system record number of the last record that was collected and placed in the online extended event file. It is a system record number, not a record number in the online extended event file. It is not a user definable value. It can be compared to the current push record to determine how many events have occurred in the system but have not been read into the online extended event file.
Last Time When Events Collected	The date and time that the last event was placed into the online extended event file. Add the cycle time to this value to estimate the next collection time. Last Time When Events Collected is also updated when a report is run that performs an archive operation before searching.

Property	*Description*
Maximum Tolerable Time Delay Between Collections (minutes)	Used when the archiving system is enabled after being disabled for some period of time. If extended event archiving system has been disabled for less than the value specified in the maximum tolerable time delay between collections, then it does not lose any events that have occurred while it has been disabled; it reads the records from the last event collected up to the current push record. If extended event archiving has been disabled for longer than the maximum tolerable time delay between collections, then the events that occurred since it was disabled are not read into the archiving system; it reads from the current push record onwards. The time of last collection and the current time are used to check the delay period. Therefore, if the system has had a time change greater than this setting, these events are not collected even if extended event archiving is enabled. The maximum tolerable time delay should be set to approximately the time that it would take to fill the system file with events. The number of records in the system file is shown as the Maximum Standard Events parameter. This is how the archiving system determines if the events in the system file are valid or have been overwritten by events that occurred while the archiving system was disabled. For example: Maximum Standard Events: 32,000 Time taken to collect events: 8 days (11,520 mins)
Extended Event collection will not occur if free disk space falls below	The amount of disk space that must be free for extended event archiving to operate. If free disk space falls below this value, then the system stops collecting events, the status of the archiving system changes to “Full Disk”, and a disk space error alarm is generated. This value ensures that the Extended Event Archiving system won’t take up all the disk space and prevent the operating system from working.
Tape Save Action	Select whether to add events after existing data on the archive tape, or to replace existing data from the start of the tape.

The following table provides a description of each extended event archiving status.

Status	***Description***
OK	The extended event archiving system is operating as required.
Overload	The system is receiving events at a faster rate than it is configured to copy them into the online extended event file. This might happen in a peak traffic period, if the number of events being received during the extended event collection cycle period is greater than the extended event collection throttle value. The system should recover from this overload state when the rate of receiving events falls below the collection throttle value. If the overload status stays on permanently, or for prolonged, frequent periods, the collection throttle value needs to be increased as the number of events being generated is too great for the system to continually process.
Failed	A required archive to tape has not been performed and the online extended event file has filled up again. The online events cannot be copied to the archive file because the system will not overwrite the existing file until it is archived to tape. The Failed alarm will be generated at every collection cycle period until the file is archived to tape. After this archive has been done, the system will copy the online extended event file to the archive file and indicate that another archive needs to be performed. The system will resume collection of events into the online extended event file. The second archive must be done before the online file has filled up, otherwise the failed alarm will be generated again.
Full Disk	When there is not enough free space on the hard disk to store events, the system will stop collecting events and the status will become “Full Disk”. A “Disk Space Error” alarm will be generated when this happens.
Copy Mode	Valid for redundant systems only. If the backup system has been off-line for some reason, then the backup system will not have all of the events in it’s online event file. When the backup system comes back online, the online event file is copied to it from the primary system. At this time no events can be stored in the primary system’s online event file. The status of the archiving system becomes “Copy Mode” during the time that the online event file is being copied to the backup system.

Table 19.1 Extended Event Archiving Status

20 Using PlantScape Data in Other Applications

This chapter describe how PlantScape data can be used for purposes other than operator-related activities such as supervisory control and data acquisition.

PlantScape provides the following methods for accessing server data:

- The *PlantScape ODBC Driver option* is designed for retrieving PlantScape data via ODBC-compliant applications such as Crystal Reports, Microsoft Access, or Microsoft Excel.
- The *PlantScape ODBC Data Exchange Report option* enables you to transfer data between the PlantScape server database and an ODBC-compliant database.
- The *PlantScape OPC Server* option enables an OPC Client to access PlantScape Server point data.
- The *PlantScape Application Programming Interface (API)* and *Network API* enable you to create custom applications that run on the server or on other PCs on the network. You can also use these APIs if you want to configure reports that initiate application programs.
- The PlantScape advanced network option *Microsoft Excel Data Exchange* enables users on the network to access point value information from the PlantScape database without accessing Station.

You can also extract PlantScape data using the PlantScape Free Format or Integrated Microsoft Excel reports. For details on these reports, refer to "Configuring Free Format Reports" on page 270 and "Microsoft Excel Reports" on page 265.

PlantScape ODBC Support

ODBC is a standard set of function calls for accessing data in a database. These calls enable you to perform Structured Query Language (SQL) queries on the database.

ODBC can be used in any client/server architecture, regardless of whether the database and client application are resident on the same computer, separated by a network, or even if they are on different computers using different operating systems.

PlantScape ODBC support enables the transfer of data between the PlantScape server database and other third-party databases. The supported databases are any application that provides support for ODBC function calls (for example, Microsoft Access) or has an ODBC driver.

ODBC support is provided through two separate PlantScape options:

- ODBC Driver, which enables retrieval of:
  - Point data
  - History data
  - Event data

  Note ODBC Driver is intended for ad hoc queries. For repetitive or high-speed data retrieval you should consider Microsoft Excel Data Exchange, Network API, or OPC Server.
- ODBC Data Exchange Report, which enables two-way transfer of:
  - All server data

About the PlantScape ODBC Driver

The PlantScape ODBC driver enables you to access PlantScape Server data (such as history, event, access, and point data) directly from any application that provides ODBC support; for example, Microsoft Access, Microsoft Excel, or Crystal Reports.

The PlantScape ODBC driver has two parts: the ODBC Server and the ODBC Client.

- The PlantScape ODBC Client handles the ODBC calls made by a client application and passes them to the PlantScape ODBC Server.
- The ODBC Server processes the ODBC calls, queries the PlantScape Server database and returns the information to the client application.

The PlantScape ODBC Server always runs on the PlantScape Server computer. The PlantScape ODBC Client can run on the server or on any other computer on the network. The following diagram shows a basic PlantScape ODBC driver configuration.

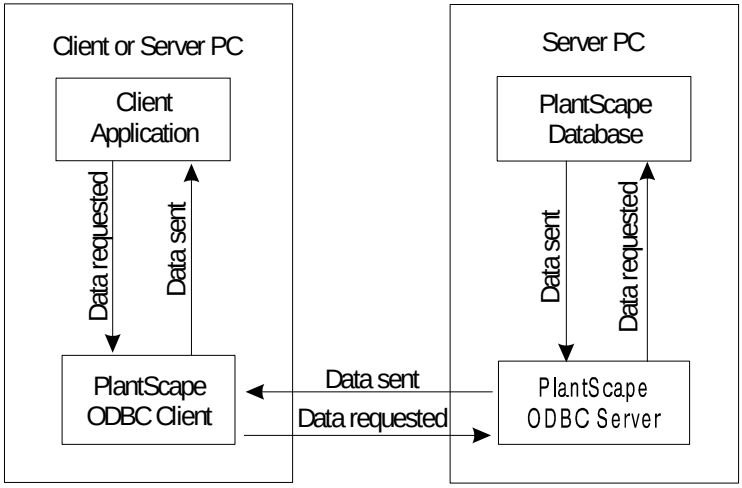


Figure 20.1 Accessing Data via the ODBC Driver

For information about other PlantScape ODBC driver architectures refer to the *Installation Guide*. For more information about ODBC, refer to the documentation for the third-party software that you are using to query the PlantScape database (for example, Microsoft Access).

Configuring the PlantScape ODBC Driver

The following procedures assume that you have already completed the installation of the PlantScape server software as described in the *Installation Guide*. Specifically, the procedures assume that:

- You have installed the PlantScape ODBC Client software on the client computer (that is, the computer that will be used to query the PlantScape Server database).
- You have also installed the client application (for example, Microsoft Access) and its ODBC components, on the client computer.

The configuration procedures may vary according to the client application that you will use to query the PlantScape server database. Application-specific help is usually provided with the client application. In general, however, the procedures are as follows:

1. Configure a data source on the client computer, as described in "Configuring a Data Source" on page 394). This only needs to be done once per computer, not every time you wish to set up a query.
2. Start up the client application and use the ODBC support provided to connect to the PlantScape server database, as described in "Connecting to the PlantScape Server Database" on page 396).
3. Set up a query to query the PlantScape server database.

Configuring a Data Source

To query the PlantScape server database you need a configured data source on the client computer from which you are making the query.

Configuring a data source sets up an association between a data source name (DSN) and an ODBC driver. Your client application will prompt you for a DSN to connect to before sending queries to the PlantScape server database.

To configure a data source for Windows 2000:

1. Select **Start** ⇒ **Settings** ⇒ **Control Panel** ⇒ **Administrative Tools**.
2. Double-click **Data Sources (ODBC)**. The ODBC Data Source Administrator opens.
3. Select either the User DSN or the System DSN tab.
4. Click **Add** to start the Create New Data Source wizard.
5. Select **PlantScape ODBC Driver** from the list of installed ODBC drivers, and click **Finish** to display a Setup dialog box for the selected source.

6 Use the **Data Source Name** and **Description** fields to enter a data source name and description. It is advisable to name the data source after the PlantScape server that you will be querying.

For example, if your PlantScape server is called `hsserv`, enter **`hsserv`** as the data source name, and enter **`Data source for PlantScape database on hsserv`** as the description.

7 Click **OK** to close the Setup dialog box.

8 Click **OK** to close the ODBC Data Source Administrator dialog box.

Note

- File data sources, which enable access over the network, cannot be built for the PlantScape ODBC driver via the ODBC Administrator. If you require a file data source:
  a) Build a system data source.
  b) Using any text editor, create a file containing
  ```
  [ODBC]
  DSN=<data source name>
  ```
  Where `<data source name>` is the same as built in Step a above.
  c) Save the file on your computer. The DSN is the name of the saved file.
- If you intend to query multiple PlantScape servers from a single client, you need to set up a data source for each server.

To configure a data source for Windows NT:

1 Select **Start ⇒ Settings ⇒ Control Panel**.

2 Double-click **Data Sources (ODBC)**. The ODBC Data Source Administrator opens.

3 Select either the User or the System DSN tab.

4 Click **Add** to start the Create New Data Source wizard.

5 Select **PlantScape ODBC Driver** from the list of installed ODBC drivers, and click **Finish** to display a Setup dialog box for the selected source.

6 Use the **Data Source Name** and **Description** fields to enter a data source name and description. It is advisable to name the data source after the PlantScape server that you will be querying.

For example, if your PlantScape server is called `hsserv`, enter **`hsserv`** as the data source name, and enter **`Data source for PlantScape database on hsserv`** as the description.

7 Click **OK** to close the Setup dialog box.

8 Click **OK** to close the ODBC Data Source Administrator dialog box.

Note

- File data sources, which enable access over the network, cannot be built for the PlantScape ODBC driver via the ODBC Administrator. If you require a file data source:
  a) Build a system data source.
  b) Using any text editor, create a file containing
  `[ODBC]`
  `DSN=<data source name>`
  Where `<data source name>` is the same as built in Step a above.
  c) Save the file on your computer. The DSN is the name of the saved file.
- If you intend to query multiple PlantScape servers from a single client, you need to set up a data source for each server.

Connecting to the PlantScape Server Database

Connection to the PlantScape server database via ODBC is different in each Client application. Consult the documentation accompanying the application for details. For a step-by-step guide for Microsoft Access see "Using PlantScape ODBC Driver and Microsoft Access" on page 408. For information for Microsoft SQL Server 7.0 see "Using PlantScape ODBC Driver and Microsoft SQL Server" on page 413.

In general:

1 When prompted by the client application, select the data source you configured (as described in the previous section). This displays the Connection Details dialog box, which enables you to connect to your PlantScape database.

2 Complete the fields as follows:

In this field...	*Enter...*
Operator ID	The user ID of an operator already configured on your PlantScape system.
Password	The corresponding password

In this field…	*Enter…*
Server Name	The name of the computer on which the PlantScape Server software is running. If you are running a redundant system, enter only the base part of the server name. For example, if your two servers are called hsserva and hsservb enter only hsserv as the server name. The ODBC driver will connect automatically to the computer currently running as primary. If you are running the query from the PlantScape Server you can enter localhost in this field.
Redundant Server	Check this box if you are running a system with redundant servers.
Dual LAN	Check this box if you have a dual network.

Note When querying the PlantScape database, you must connect to it as one of the operators already configured in the PlantScape server database. The PlantScape ODBC driver honors any area assignment restrictions that apply to that operator: that is, operators can only see data relating to areas to which they have been granted access.

If you are using a system DSN and want to establish a connection between the PlantScape database and a remote SQL server you need to add an entry to the registry.

To establish connection between the PlantScape database and a remote SQL Server:

1. Open a Command Prompt window and enter the command:

   `regedit`

2. Go to the registry key:

   `HKEY_LOCAL_MACHINE\SOFTWARE\odbc\OCBC.INI\<PlantScape data source>`

   Where `<PlantScape data source>` is the is the data source you configured (as described in "Configuring a Data Source" on page 394).

3. Add a new string, `RemoteHost`, and set the value to the name of the computer the PlantScape Server is running on.

Setting Up Automatic Connection to the PlantScape Database

Note This section is not applicable if you are using Microsoft SQL Server 7.0.

Normally when you query the PlantScape database you are prompted to connect to the database via the Connection Details dialog box. It might sometimes be useful for the client application to connect to the database without the user having to log in (for example, if you have set up a periodic reporting facility).

You can set up an automatic connection by storing connection information for a particular data source in the registry.

> **Caution**
>
> The information stored in the registry (including the password) is not encrypted. If someone has access to your registry, then they can access this information. If you are going to use this feature of the ODBC driver you should ensure that your registry is secure.

To set up an automatic connection to the PlantScape database:

1 Open a Command Prompt window and enter the command:

```
regedit
```

2 Go to the registry key:

```
HKEY_CURRENT_USER\Software\ODBC\ODBC.INI\<PlantScape data source>
```

where `<PlantScape data source>` is the data source you configured (as described in "Configuring a Data Source" on page 394) and wish to automatically connect to.

3 Add the following new string variables, with values as shown below:

```
UID = operator id
PWD = corresponding password
RemoteHost = Server name
RedundantLAN = 1
```

(Use this value if you have a dual LAN; otherwise set the value to **0**.)

```
RedundantCPU = 1
```

(Use this value if you have redundant servers; otherwise set the value to **0**.)

Note The redundancy variables do not need to be added unless you have a redundant system. They default to **0**.

What Data Can You Access with the PlantScape ODBC Driver?

The data that can be queried in the PlantScape database is presented to the client application in the form of tables. The following sections describe those tables and how to use them.

Point Tables

You can query the following PlantScape point tables with the ODBC driver:

- AccumulatorPoint
- AnalogPoint
- StatusPoint
- FlexiblePoint
- ControlModulePoint (for accessing points on the Honeywell Control Processor)

The point fields (which are visible as columns in each of the point tables) are shown in the following graphic.

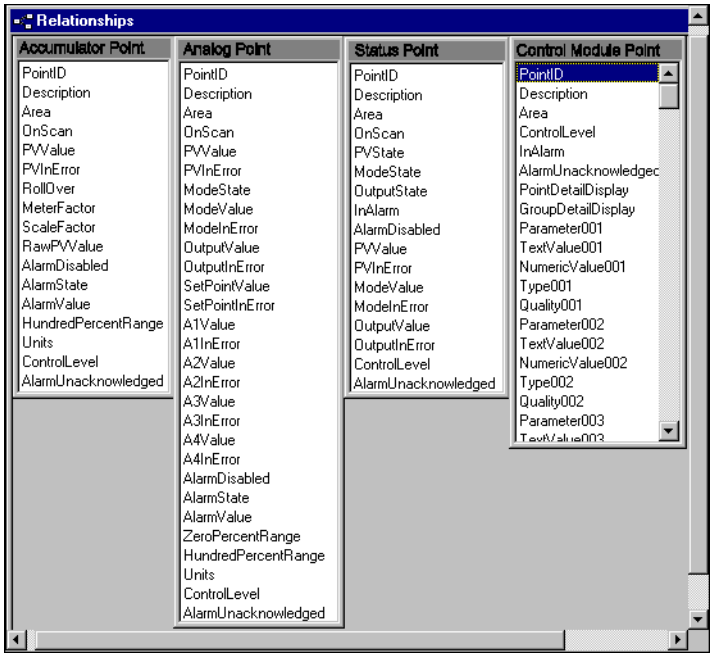


Figure 20.2 Point Data That You Can Access

Status, analog, flexible, control module, and accumulator point tables can be opened and viewed directly from most client applications that have ODBC support (for example, Microsoft Access).

A table opened in this way displays every point field for every point of that type in the PlantScape server database. This might be more information than is needed.

To select particular data out of the table, you need to build a query. A query can be used to reduce the number of columns (point fields) or rows (points) which are retrieved from the database. In some client applications a wizard will assist you to build a query; the application converts this query to SQL before sending it to the ODBC driver. A query built using a Microsoft Access wizard is shown below. It selects all point fields for all status points currently in alarm.

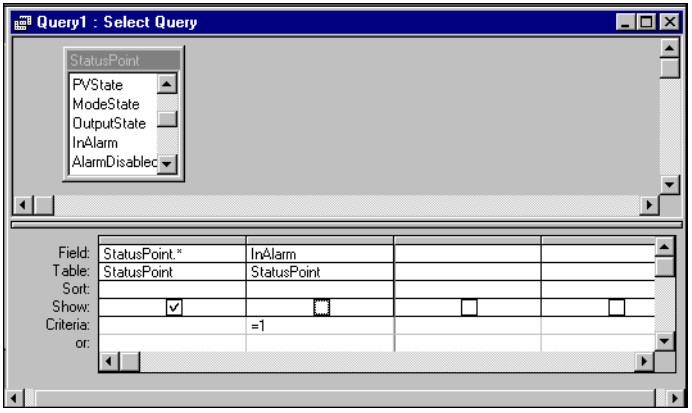


Figure 20.3 Microsoft Access Query

The SQL equivalent of the above query is:

```
SELECT StatusPoint.*
FROM StatusPoint
WHERE StatusPoint.InAlarm=1;
```

Flexible Point tables might be too large to open and view without filtering. To retrieve information from very large tables you need to set up a query that specifies the required parameters.For information about setting up queries on control module points, see “SQL Query on ControlModulePoint Table” on page 401.

The first 28 columns in the Flexible Point table (see Figure 20.2, “Point Data That You Can Access” on page 399) are common to all flexible points and can be accessed by name. The other columns are parameters of the particular kind of flexible point.

To access a flexible point parameter, you set ParameterXXX to equal the parameter you need. PlantScape then sets the QualityXXX, TypeXXX, and TextValueXXX parameters to the corresponding values. For example, if you set Parameter001, then Quality001, Type001, TextValue001 and NumericValue001 will contain values corresponding to this parameter for every point.

For information about parameter names, see the relevant Point Server documentation supplied with the Point Server software.

SQL Query on ControlModulePoint Table

The first eight columns in the ControlModulePoint table (see Figure 20.2, “Point Data That You Can Access” on page 399) are common to all flexible points. The other columns are user-designated parameters. To access a user-designated parameter, set ParameterXXX to equal the parameter name. For example, Parameter001 = PIDA.SPTVNORMRATE.

Quality001, Type001, TextValue001 and NumericValue001 will then contain values corresponding to this parameter for every point. Below is an example query retrieving these fields for the parameter PIDA.SP for every point on the system.

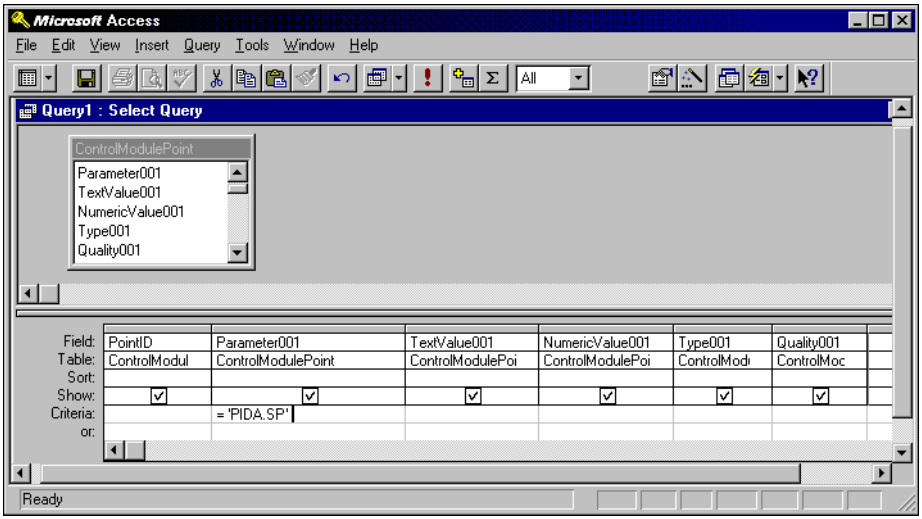


Figure 20.4 Control Module Point Query

The SQL equivalent of the above query is:

```
SELECT PointID, Parameter001, TextValue001,
NumericValue001, Type001, Quality001
```

```
FROM ControlModulePoint
WHERE Parameter001 = 'PIDA.SP'
```

The result set is shown below.

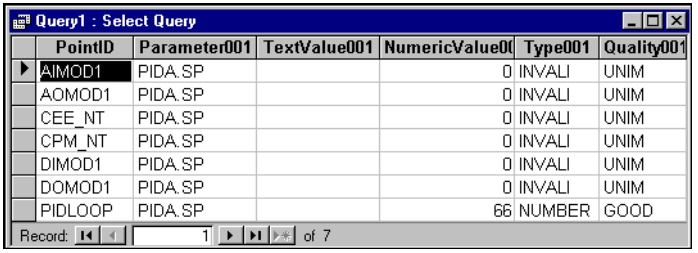


Figure 20.5 Result for Example Query for Control Module Point

The **Quality** field indicates the point parameter status when the data was retrieved. It can take the following values:

`UNIM`
: The parameter has not been implemented for the point.

`UNSPECIFIED`
: No parameter has been specified in the parameter field.

`NaN`
: The numeric value is not a floating point number (NaN).

`BAD`
: The parameter status is bad and not NaN.

`GOOD`
: There are no errors for the value.

The **Type** field indicates one of four parameter types: ENUM, NUMBER, TEXT, or INVALI.

The relationship between the **Quality** and **Type** field is as follows:

- If the quality is shown as BAD, then the type is shown as INVALI.
- If the quality is shown as NaN, then the type will be set and the corresponding value will be the last good value of the parameter.

The relationship between the **Type** field and the **TextValue** and **NumericValue** fields is as follows:

- If the parameter type is TEXT, then the value is shown in the **TextValue** field.
- If the parameter type is NUMBER, the value is shown in the **NumericValue** field.
- If the parameter type is ENUM, the value is shown in both the **TextValue** and the **NumericValue** field.
- If the parameter type is INVALI, no data is shown in either field.

The following table summarizes this relationship.

	Applicable Value Field	
Type	***TextValue***	***NumericValue***
ENUM	✔	✔
TEXT	✔	✘
NUMBER	✘	✔
INVALI	✘	✘

Table 20.1 Parameter Types and Value Fields

You can retrieve more than one parameter in a query by setting subsequent ParameterXXX fields to other parameter names; for example, Parameter002 = PIDA.pv, Parameter003 = PIDA.op.

The number of parameters that you can retrieve in one query might be restricted by the application you are using. For example, Microsoft Access limits this number to about 40. The total size of the record being retrieved may also be limited. If you are retrieving every field for every parameter, the number of parameters able to be viewed in Microsoft Access will be reduced to 14. This number can be increased by not requesting fields which you don't require, for example the **TextValue** field for numeric parameters.

The following restrictions apply to queries involving Control Module points:

- Wild cards are not permitted in the parameter names of Control Module points.
- 'Or' conditions cannot be used in the query.

Event Tables

All PlantScape events displayed in the Event Summary can be viewed through the Event table (Figure 20.6, “Event Table Data” on page 404). Like the point tables, the Event table can be opened and viewed directly from most client applications.

Figure 20.6 Event Table Data

The following query, created in Microsoft Access, selects all events on the point **Sinewave** and displays only the time of each event, the event type and level, and the value of the point at the time of the event.

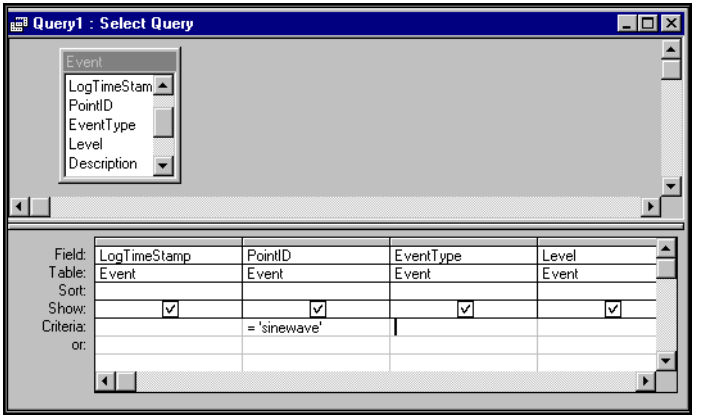


Figure 20.7 Select Query Dialog Box

The same query in SQL is:

```
SELECT LogTimeStamp, PointID, EventType, EventLevel,
Value
FROM Event
```

```
WHERE (PointID='sinewave')
```

Note

- If no value is specified for LogTimeStamp, then, by default, only events generated within the last 24 hour period are returned.

History Tables

Nine history tables from the PlantScape database are visible via the ODBC driver. These are:

- History1HourAverage
- History1HourSnapshot
- History1MinSnapshot
- History24HourAverage
- History24HourSnapshot
- History5SecondSnapshot
- History6MinAverage
- History8HourAverage
- History8HourSnapshot

Unlike most other tables, history tables cannot be opened and viewed directly. You need to build a query that specifies the point (or points) whose history you are interested in. The first columns in a history table are shown below. All history tables have the same columns.

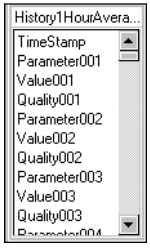


Figure 20.8 History Table List

To specify the point whose history you are trying to retrieve, you must set ParameterXXX to equal the point ID and parameter.

For example, Parameter001 = 'TankLevel.pv'. This sets Value001 to be the value of the TankLevel's PV, and Quality001 to be the quality of the corresponding history value. The quality indicates the state of the point at the time the sample was taken. Possible qualities are:

GOOD

There are no errors.

BAD

The point was not scanning at time sample taken.

NOT HISTORIZED

The specified parameter has not been assigned to history, but the point has been implemented.

POINT UNSPECIFIED

One of the parameters in the query does not have the corresponding point specified.

UNIMPLEMENTED

The point specified does not exist in the database.

If the parameter name is not specified, it defaults to the point's PV.

As an example, a query set up in Microsoft Access is shown below. This query returns snapshot history values of the PV parameter of the point TankLevel for every minute between 10 am and 4 pm on the 25/7/97.

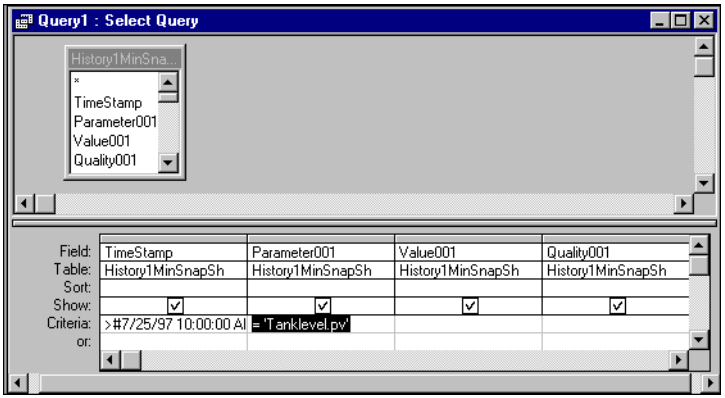


Figure 20.9 Design View of a History Table Query in Access

The equivalent SQL query is:

```
SELECT "TimeStamp" ,"Value001", Quality001
FROM "History1MinSnapshot"
WHERE ( ( ("Parameter001" = 'TankLevel.pv' ) AND
    ("TimeStamp" > {ts '1997-07-25 10:00:00'} ) ) AND
    ("TimeStamp" < {ts '1997-07-25 16:00:00'} ) )
```

Case-Sensitive Searches

By default all queries made by the PlantScape ODBC driver are case insensitive. For some queries it might be useful to perform a case-sensitive search. If you want to make searches case-sensitive for a particular data source, you need to add a string to the registry. To do this:

1. Open a Command Prompt window and enter the command:

   `regedt32`

2. Go to the registry key

   `HKEY_CURRENT_USER->Software->ODBC->ODBC.INI->`
   `<PlantScape data source>`

   where:

   `<PlantScape data source>`

   Is the data source you configured (as described in "Configuring a Data Source" on page 394) and wish to use to do case-sensitive searches.

3. Add the following new string value for that registry key.

   `CaseSensitive`

4. Set the Data value to:

   `1`

Troubleshooting ODBC Driver

Spurious Entries in Data Tables

Entries such as "#NAME" or "#DELETED" can appear in the tables in Microsoft Access if you select an entry in a Unique Identifiers dialog box after you have selected the data tables (see "Step 1. Linking Tables" on page 408).

Login and Password Rejected When Connecting to the Data Source

Connecting to the data source requires a PlantScape login and password. PlantScape is supplied with the default login `mngr`, password `mngr1`. For information about adding new operator logins, see "Defining an Operator" on page 216.

Using PlantScape ODBC Driver and Microsoft Access

The following example assumes that you have already completed the installation and configuration of your PlantScape system with the ODBC driver.

It assumes that you have:

- Installed the PlantScape Server software
- Installed the ODBC Client software on a client computer
- Configured a data source on the client computer
- Installed Microsoft Access on the client computer
- Started the PlantScape system on the server computer

The example is based on the following architecture, where the ODBC client software and Microsoft Access are installed on a network computer.

Step 1. Linking Tables

The first step is to link tables so that you can view PlantScape server data.

To link tables:

1. Start up Microsoft Access on your client computer and open a new (blank) database.
2. Click the right mouse button in the database window to display the pop-up menu, and select **Link Tables**.

   This displays the Link dialog box.

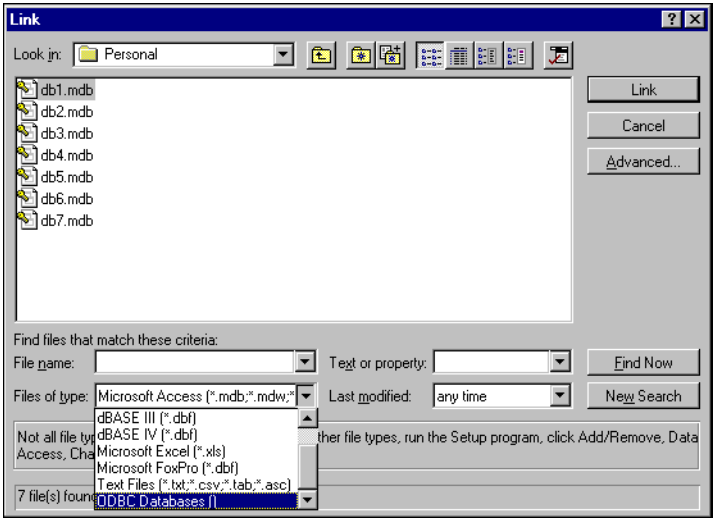


Figure 20.10 Link Dialog Box

3 From the Files of Type combobox, select ODBC Databases.

This displays the Select Data Source dialog box.

4 Select **PlantScape Data Source**, or the data source you configured with the PlantScape ODBC driver and click **OK**.

This displays the Connection Details dialog box.

5 Use the Connection Details dialog box to connect to your PlantScape database as follows:

- In the **Operator ID** field, enter the ID of an operator already configured on your PlantScape system.
- In the **Password** field, enter the corresponding password
- In the **Server Name** field, enter the name of the computer on which the PlantScape server software is running.

  If you have a redundant system, enter only the base part of the server name. For example, if your two servers are called **hsserva** and **hsservb**, enter only **`hsserv`** in this spot. The ODBC driver will connect automatically to the computer currently running as primary.
- If your system has a redundant server or dual LAN check the appropriate box.
- Click **OK**.

This displays the Link Tables dialog box.

6 Click **Select All**, and then **OK** to produce links to all the visible tables from the PlantScape database.

7 A number of dialog boxes titled Select Unique Identifier appear. Click **OK** in each dialog box without selecting any items.

Note These dialog boxes refer to a feature that is not supported by the PlantScape server. Changing anything in any of these boxes can lead to unpredictable results.

You have now created links to all the tables in the database. The table names and icons should be visible when the Tables tab is selected.

Step 2. Viewing Tables

Most tables can be viewed without writing a specific query. For example, you can click the Event table to retrieve and display events from the last 24 hours.

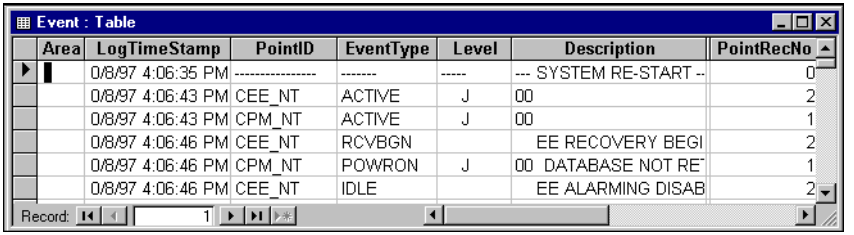

Event : Table
Area
LogTimeStamp
PointID
EventType
Level
Description
PointRecNo
0/8/97 4:06:35 PM ---------- ------- ----- --- SYSTEM RE-START -- 0
0/8/97 4:06:43 PM CEE_NT ACTIVE J 00 2
0/8/97 4:06:43 PM CPM_NT ACTIVE J 00 1
0/8/97 4:06:46 PM CEE_NT RCVBGN EE RECOVERY BEGI 2
0/8/97 4:06:46 PM CPM_NT POWRON J 00 DATABASE NOT RE 1
0/8/97 4:06:46 PM CEE_NT IDLE EE ALARMING DISAB 2
Record: 1

Figure 20.11 Event Table Viewed in Access

All tables except the History and ControlModulePoint tables can be opened in this manner.

Step 3. Designing a Simple Query

The following queries assume you have built a system sinewave point (called sinewave) on your PlantScape system that:

- Generates high and low alarms
- Is configured to collect fast history

To do this:

1 Start up Quick Builder and open a new project.

2 Add a channel, select the channel type **UserScanTask**.

Note You must be licensed for user scan tasks to build a channel of this type.

3 Add a controller, choosing the controller type **UserScanTask**, and set:

- The channel name to that of the channel you just created
- The file number to 8
- The record number to 1

- The LRN number to 0

4 Add an analog point and set:
   - The PointID to **`sinewave`**
   - The PV Scan Period to **`2`** seconds
   - The PV Source address to the controller just built, with a location of **`114`**.

5 Select the Alarm tab and set:
   - The PV High with urgent priority and limit 90
   - The PV Low with urgent priority and limit 10

6 Select the History tab and assign the PV to fast history.

7 Start Station and log in at MNGR level.

8 From the menu bar, select **Configure ⇒ Advanced ⇒ System Sinewave**.

9 Set the maximum sinewave value to 100, the minimum sinewave value to 0, and the period to a non-zero value (say, 500).

Building a Point Query

To build a query that selects all the analog points which are currently scanning:

1 In your Microsoft Access database, select the **Queries** tab.

2 Click **New** to display the New Query dialog box.

3 Select **Design View** and click **OK** to display the Show Table dialog box.

4 Select **AnalogPoint**, click **Add**, and then close the dialog box to bring up the design view.

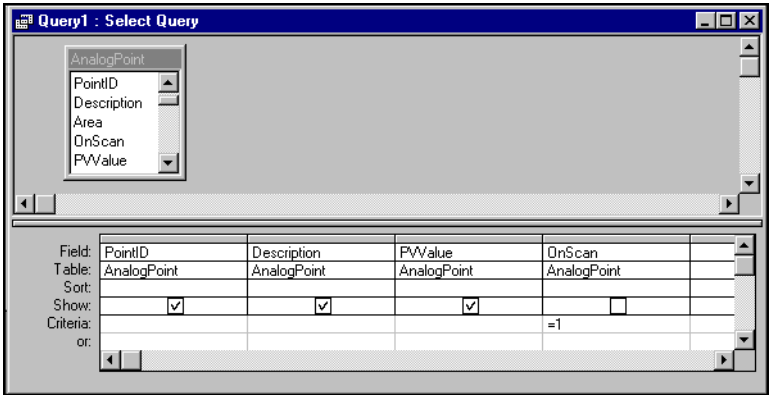


Figure 20.12 Design View of an AnalogPoint Query in Access

5 In the first row/first column select **PointID** from the drop-down list.

6 In the second column select **Description** from the drop-down list.

7 In the third column select **PVValue**.

8 In the fourth column select **OnScan**. In the **Criteria** row, type:

```
=1
```

(to select all the points which are currently scanning)
Unmark the check-box to prevent this column from being displayed.

9 Select **View** ⇒ **Datasheet** to send the query to your PlantScape database.
You should see a table like the one below.

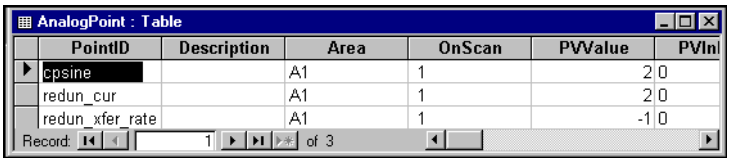


Figure 20.13 Results of Query on Analog Point Table in Access

Building an Event Query

To build a query that select all events in the last 24 hours that have raised urgent alarms:

1 In the New Query dialog box, select **Design View**.

2 Select **Event**, click **Add**, and then close the dialog box.

3 In the first row/first column select **Event*** from the drop-down list.

4 In the second column select **Level**. In the **Criteria** row, add:

```
Like 'U*'
```

5 Select **View** ⇒ **Datasheet** to send the query to your PlantScape database.

By default, the ODBC driver retrieves events over the last 24 hours. If you want to retrieve events over a specific period of time:

1 Select **LogTimeStamp** from the next free column.

2 In the Criteria row, add:

```
> 8:30 24/5/98 AND < 15:30 24/5/98
```

(using the actual timespan of your choice)

Building a History Query

The format for history queries is slightly different from other queries because the names of points are system-configurable.

To build a query which retrieves the 5-second snapshot values of your sinewave point over a 10 minute period:

1. Select the Queries tab.
2. Click **New**, select **Design View** and click **OK** to display the **Show Table** dialog box.
3. Select **History5SecSnapshot**, click **Add**, then close the dialog box.
4. In the first row/first column click the left mouse button and select **TimeStamp** from the drop-down list.

   In the **Criteria** row add:

   ```
   > 8:30 24/5/98 AND < 8:40 24/5/97
   ```

   (using the actual timespan of your choice)
5. In the second column select **Parameter001**.

   In the Criteria row add:

   ```
   ='sinewave.PV'
   ```
6. In the third column select **Value001**.
7. In the fourth column select **Quality001**.
8. Select **View** ⇒ **Datasheet** to send the query to your PlantScape database.

Using PlantScape ODBC Driver and Microsoft SQL Server

This section assumes that you have already completed the installation and configuration of your PlantScape system with the ODBC driver.

It assumes that you have:

- Installed the PlantScape Server software
- Installed the ODBC Client software on a client computer
- Configured a data source on the client computer
- Installed Microsoft SQL Server on the client computer
- Started the PlantScape system on the server computer

To configure Microsoft SQL Server you use the DTS Wizard and includes the following steps:

- Configuring the data source in SQL Server
- Configure the destination SQL Server database
- Selecting the tables you want to link to
- Select when data is copied

To configure Microsoft SQL Server:

1. Select **Start ⇒ Programs ⇒ Microsoft SQL Server 7.0 ⇒ Import and Export Data**. The DTS Wizard starts.
2. Select PlantScape Server ODBC Driver from the Source list.
3. Select the previously configured data source from the User/System DSN list.
4. Enter a PlantScape operator-based security operator ID and password. Click **Next**.
5. Select **Microsoft OLE DB Provider for SQL Server** from the Destination list.
6. Specify the computer name on which the SQL server is running.
7. Select the SQL database name. Click **Next**.
8. Select **Copy table(s) from the source Database**. Click **Next**.
9. Select the PlantScape tables you want to copy. Click **Next**.
10. Select Run immediately to ensure PlantScape data is copied when queried.
11. Select Save to save these settings.
12. Click Finish.

About PlantScape ODBC Data Exchange

The ODBC Data Exchange option enables you to configure the two-way exchange of data between the PlantScape server database and an ODBC-compliant local or network third-party database, using standard Structured Query Language (SQL) commands.

When you configure the PlantScape ODBC Data Exchange option, the PlantScape server acts as a *client* application. (Contrast this with the PlantScape ODBC Driver option where the PlantScape server acts a *server* application.)

Data from a local PlantScape server database can be transferred to a third-party database, and data from a third-party database can be transferred into the PlantScape server database. The information that can be exchanged includes point values, point history, and user file data.

The ODBC Data Exchange option transfers data to and from a third-party database using the ODBC interface. An ODBC driver must be installed for the third-party database. Databases that include ODBC drivers include Microsoft SQL Server, Oracle 7, Microsoft Access, and Sybase 10.

The following diagram shows how the PlantScape ODBC Data Exchange option interacts with ODBC drivers and third-party databases.

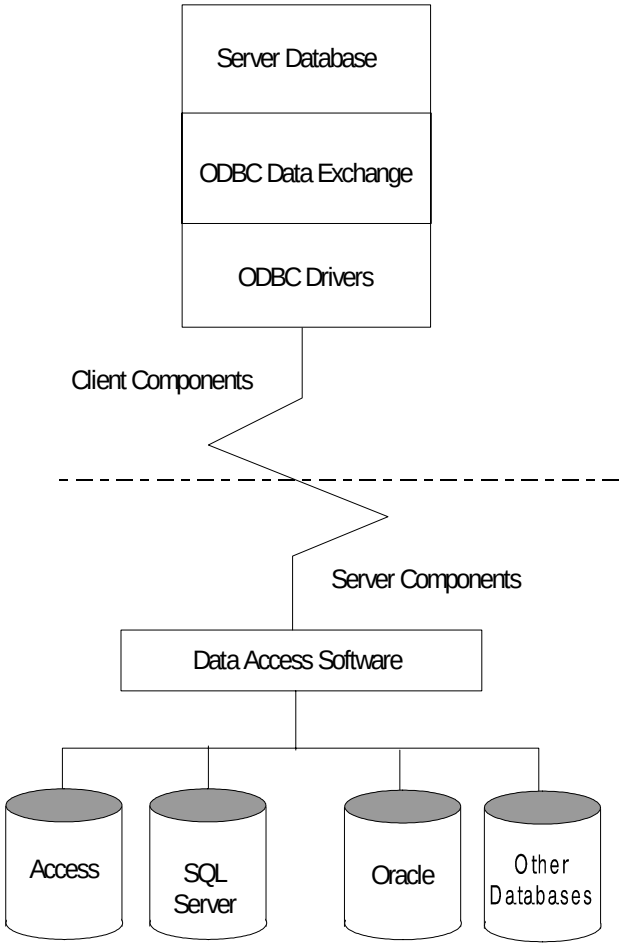


Figure 20.14 ODBC Data Exchange Architecture

Configuring ODBC Data Exchange Reports

The following procedures assume that you have already completed the PlantScape ODBC Data Exchange installation as described in the installation guide. Specifically, the procedures assume that:

- Your PlantScape Server license includes ODBC Data Exchange
- You have installed the third-party ODBC driver on the PlantScape server for the database that you will be transferring data to and from. (For information on installing and configuring the ODBC driver, consult the documentation supplied with the third-party database.)

The configuration procedures depend to a certain extent upon the third-party databases you intend to use in conjunction with the PlantScape ODBC Data Exchange option. In general, however, the procedures are as follows:

1. Configure a data source on the PlantScape server, as described in "Configuring the ODBC Data Source" on page 417).
2. Configure the ODBC Data Exchange Report, as described in "Configuring the ODBC Data Exchange Report" on page 418.
3. Create the Input Reference file as described in "Specifying the Report Definition File Details" on page 418.
4. Run the report you configured in Step 2.

Configuring the ODBC Data Source

The procedures for configuring the ODBC data source vary according to the third-party database software you will be using. The following procedures show you how to configure the data source for Microsoft SQL Server 7.0. The set up for each driver will differ slightly.

To configure the data source:

1. Select **Start** ⇒ **Settings** ⇒ **Control Panel** ⇒ **Administrative Tools** ⇒ **Data Sources (ODBC)**. The ODBC Data Source Administrator dialog box opens.
2. Click the System DSN tab to display the available data sources.
3. Click **Add** to display the Create New Data Source wizard.
4. Select **SQL Server** from the list of installed ODBC drivers and click **Finish** to open the **ODBC driver setup** dialog box.
5. In the ODBC driver setup dialog box:
   a) Enter the data source name, description and Server name and click **Next**.

b) Click **Next** and follow the prompts to complete the SQL Server configuration.

Notes

If you intend to use multiple databases, you need to set up a data source for each database.

Configuring the ODBC Data Exchange Report

The next step is to use the ODBC Data Exchange Report Configuration display on Station to configure details about the report such as:

- The input reference file name
- Data source name
- Scheduling information for the report

Two displays are used to configure a report:

- Definition Display

  This display is common to all reports. Details on using this display are described in “Configuring Definition Details” on page 243.
- Content Display

  Each type of report has a contents display that is specific to the type of report you want to create. For details on configuring the contents of a report on Station, see the following sections.

Specifying the Report Definition File Details

Input Reference File

The Input Reference file defines the actions carried out in the ODBC Data Exchange Report. To create this file, see “Creating the Input Reference File” on page 421.

In this field enter the full path to the Input Reference file for running the report, or the relative path from the server run folder.

Record Number Offset

Enter a record number offset to be added to the absolute value of any negative record numbers used in references to PlantScape server database files in the input file. This is optional and the default is zero.

Specifying the SQL Database Login Details

Data Source Name

Enter the name of the data source for the database to which the report is to connect. This name should match the Data Source Name entered when you configured the ODBC System Data Source (see "Configuring the ODBC Data Source" on page 417).

User Name

Enter the user login name that has permission to access the required database. This field is optional.

Store User Password

Click this button to enter the password for the user login name that you have specified.

Using the Report Status Information

The **Report status** field of the Configuration display shows one of the following status messages:

WORKING

The report is running

GOOD

The last report completed without errors

ERROR

The last report completed with errors

Notes

1. If there are any syntax errors in the PlantScape server database references, the report is halted, the errors recorded and no data is transferred between the databases.
2. If an error occurs while transferring SQL commands to the ODBC driver, the report is halted and errors recorded.
3. All syntax error messages are written to both the report output file and the PlantScape server error log file.
4. All PlantScape server error messages are written to the PlantScape server log file.

Making a Report Secure

Report Security Level

Use the combobox to select a report security level that will be required for a user to demand a report.

Configuring the Report Setup Options

Restricting Data Upload

Data read from the ODBC database into the PlantScape server database can be restricted in two ways by stopping:

- Point PV values from being written to
- Point history values from being written to

If you do not want to allow operators to overwrite PV or history value data on the PlantScape server database, make sure that the **Enable PV Upload** and **Enable History Data Upload** options are not enabled.

Storing Failed Commands

If you wish, you can store commands that have produced database errors by enabling the **Enable Failed Commands Backup** option. If this option is enabled, a backup file is created or appended to whenever an error occurs as a result of a failed SQL command. There is one backup file per report. The reports use the naming convention `rptnnn.bak` where `nnn` is the report number.

Any command that results in an error from the SQL database server, as well as those remaining commands which were not executed as a result of the error, will be copied to this backup file, and a message is sent to the log file giving details of the error.

The backup file, if it exists, is run before the Input Reference file each time the report is requested. Execution of the backup file will halt if any SQL command results in an error. Any commands successfully completed from the backup file will be removed from that file. The backup file can be edited or deleted to stop the same erroneous commands being processed.

If any errors are detected, the report status will be set to ERROR and an alarm (priority determined by the “Alarm priority error” combobox) is raised.

Enabling Auto-Commit for SQL code

If you enable the **Auto-Commit SQL Code** option, PlantScape will automatically **commit** each command in the Input Reference file as it is executed. This means that any **rollback** commands issued will not be effective, and if a command fails, all previous commands will already have been carried out.

If this option is not enabled, the commands will be committed after successful completion of the report, or rolled back in the event of an error in the report. If you would like to perform **commit** or **rollback** operations at any other time during the report, these must be included in the Input Reference file.

Selecting an Alarm Priority in the Event of a Failed SQL Report

If the SQL report fails, an alarm is generated with a message describing the type of error. Configure the priority of this alarm by selecting an alarm type from the **Alarm priority on error** list.

Specifying How Bad Values Are Handled

You can configure how bad or Not a Number (NaN) numeric and string values are stored in the ODBC database. You use the **Replace Bad/NaN numeric values with** dropdown list to specify either a NULL or a zero. You use the **Replace Bad string values with** dropdown list to select either a NULL value or an empty string.

Creating the Input Reference File

The tasks performed by an ODBC Data Exchange report are defined in a free format ASCII file called the Input Reference file. You create this file with a text editor. The file is restricted to 80 characters per line.

Creating SQL Transactions

The Input Reference file consists of any number of SQL transactions. Each transaction is made up of:

- Commands

  Any SQL command supported by the Open Client interface can be used. Note that any variables declared in these commands will apply only until the end of the current transaction and that each transaction may be up to 1000 lines long.

  Each SQL command must begin on a new line and must end with an end-of -command marker ("`;`").
- PlantScape Server references

  References to the PlantScape server database need to be enclosed in "at" symbols (that is, in the format "`@...@`"), and can be embedded anywhere inside the SQL transaction.

Data is extracted from the PlantScape server database using PlantScape server references embedded in the SQL command before the end-of-command marker (";"). Data can be inserted into the PlantScape server database using PlantScape server references immediately after the ";".

Adding Comments to the Reference File

You can add comments to the Input Reference file to aid readability. Comments are enclosed in /*...*/ and may be nested. There must not be any comments between the end-of-command marker (";") and an embedded reference.

Adding PlantScape Server Database References

There are three ways to reference the PlantScape server database:

Point references

Access PlantScape server point parameters and send or receive data from the ODBC-compliant database

History references

Access PlantScape server point history data or receive data from the ODBC-compliant database

Table references

Access PlantScape server file data and send or receive data from the ODBC-compliant database.

The following table shows the types of embedded reference which can be used to access or write data to an PlantScape server.

Action	*PlantScape Server*
Read point parameter data	✔
Write point parameter (excluding point ID, and PV and history parameters)	✔
Write to PV parameter	✔(1)
Write to history point parameter	✔(2)
Read history	✔
Write to history	✘
Read system and user tables	✔
Write to system files	✘
Write to user tables	✔

Key: ✔ = allowed ✘ = not allowed

(1) To write to the PV parameter of a point, the report must be configured with the "Enable PV Data Upload" option enabled.
(2) To write to a point history parameter, the report must be configured with the "Enable History Data Upload" option enabled.

Table 20.2

Understanding the Report Output

The report output file contains the transactions with data substituted from the PlantScape server application database. Any syntax errors are flagged with error messages. The report file becomes a record of the data sent to the ODBC-compliant database and the errors found in the reference file.

Troubleshooting ODBC Data Exchange Reports

If an ODBC Data Exchange report fails check the PlantScape log file for the cause of the problem.

Checking Commands

SQLCHK Utility

The Input Reference file can be checked for PlantScape server database reference syntax errors by using a command-line utility, **SQLCHK**. Each command is read and if there is an embedded PlantScape server database reference before the end-of-command marker (";") it is resolved and data substituted. Embedded references occurring after the ";" are checked for consistency but data is not substituted. Any errors are flagged and a total error count is given after all commands have been read. The commands plus substitutions and error messages are printed to the workstation display and to an output file if one is specified.

Format

```
SQLCHK reference_file [-OUT output_file][-OFFSET
record_offset]
```

Where:

reference_file
: Path of input SQL file

output_file
: Optional path name of the file to receive checked data and error messages. If this is not specified, the output is printed to the display only.

record_offset
: Optional offset added to a negative record number in a reference to a PlantScape server database file. This is optional and the default is zero.

Example

```
sqlchk command.sql -out command.out -offset 3
```

ODBC Data Exchange Report Reference

The following sections provide details of how each type of database reference is formatted.

Point Reference Type

Format

```
"@ POINTREF POINTNAME pointname PARAMETER parameter
[Numeric] @"
```

Description

This reference type is used to access point parameters in the PlantScape server application database.

pointname

Point ID (tag name)

parameter

Source/destination of data. Control Module point parameters may be used here in the format <block>.<parameter>. For example, PIDA.PV. The names of commonly used point parameters are:

Parameter	*Description*
PV[3]	Process variable
MD	Mode
OP	Output
SP	Setpoint
A1	Auxiliary 1
A2	Auxiliary 2
A3	Auxiliary 3
A4	Auxiliary 4
NAME	Name
DESC	Description
H1M[4]	1 min history
H6M[4]	6 min history
H1H[4]	1 hour history
H8H[4]	8 hour history
H24H[4]	24 hour history
H5SF[4]	5 second fast history
H1HE[4]	1 hour extended history
H8HE[4]	8 hour extended history

Parameter	*Description*
H24HE[4]	24 hour extended history

Notes

1. All SQL keywords may be abbreviated to the first 2 letters
2. Each line must be no more than 80 characters long
3. Data can only be uploaded to the PV of a point if the option "Enable PV Data Upload" is enabled.
4. Data can only be uploaded to the history parameters of a point if the option "Enable History Data Upload" is enabled.
5. If you include the keyword NUMERIC, the PV is transferred as a numeric value.

Example The following example will extract the PV of the SQLSINE point on the server so that it can be stored in the ODBC-compliant database.

```
update rwb
set realnum=("@ POINTREF POINTNAME sqlsine PARAMETER PV @")
where name_id='Fred Smith';
```

The following example will extract a value from the SQL database, and store it in the PV of the SQLSINE point on the local PlantScape server.

```
select small from rwb where name_id='Fred Smith';
"@ POINTREF POINTNAME sqlpnt PARAMETER PV @"
```

History Reference Type Report

Format

```
"@ HISTORYREF POINTNAME pointname TYPE histype DATE data TIME
time OFFSET offset [ITEMS numitems] [PARAMETER paramname] @"
```

Description

This reference type is used to access point history data on the PlantScape server. You cannot use this reference type to upload history values. Individual history parameters can be uploaded using the Pointref reference type.

pointname

Point ID (tag name)

type

Source of data. The names of possible history types are:

History Type	*Description*
H1M	1 min history
H6M	6 min history
H1H	1 hour history
H8H	8 hour history
H24H	24 hour history
H5SF	5 sec fast history
H1HE	1 hour extended history
H8HE	8 hour extended history
H24HE	24 hour extended history

date

Date of history to access given as *DD-MMM-YY* format

time

Time of history to access given in *HH:MM:SS* format

offset

The offset within the history file. Use an offset of **1** to specify the most recent history data.

numitems

Optional number of history items to read

Parameter

Any valid parameter name, including control module point parameters can be used.

For a complete list of point parameters see Table 8.1, “Summary of Point Parameter Types,” on page 134.

Notes

- All SQL keywords may be abbreviated to the first 2 letters.
- Specify either the date and time, or an offset, but not both.

Example The following example will extract five `SQLSINE` values in 6 minute history starting from 10 samples ago, and store values in the ODBC-compliant database.

```
insert into historytable
values
(“@HISTORYREF POINTNAME sinewave TYPE H5SF OFFSET 5
ITEMS 10 @”)
;
```

Table Reference Type Report

Format

```
"@ TABLEREF TABLENUM table RECORDNUM record WORDNUM word
NUMRECORDS numrecords datatype @"
```

Description

This reference type is used to access file data in the PlantScape server database.

table
The server file number to read from or write to

record
First record number to use

word
First word number to use

numrecords
The number of records to read/write

datatype
A data type for each column in the ODBC-compliant database must be entered. The following data type SQL keywords are available.

Data Type Keyword	***Data Type Description***	***Data Item Following Keyword***
FLOAT	Floating point	[Optional number of items]
2INT	2 byte integer	[Optional number of items]
4INT	4 byte integer	[Optional number of items]
CHAR	Character string enclosed in '...'	Number of characters + [Optional number of items]
RAWCHAR	Character string not enclosed in '...'	Number of characters + [Optional number of items]
BITNUMBER	Start bit of partial integer	Bit number
SIZE	Size of partial integer	Number of bits + [RPTBIT keyword to denote bit repeat] + [Optional number of items]
RPTBIT	Denotes that successive partial integer items should be taken from the same word	

Table 20.3

Data Type Keyword	*Data Type Description*	*Data Item Following Keyword*
JULDATE	Date in Julian format	[Optional number of items]
TIME	Time in seconds since midnight	[Optional number of items]
DATETIME	Date and time in the format *DD-MMM_YY HH:MM*	[Optional number of items]

Table 20.3

Notes

1. All SQL keywords may be abbreviated to the first two letters.
2. For table data being extracted from the PlantScape server, any database file can be accessed.
3. For table data being inserted into the PlantScape server database, only user files can be accessed.
4. If the BITNUMBER keyword is used, then the SIZE keyword must appear after the bit number (that is, `BITNUMBER` *`bitnumber`* `SIZE` *`num-of-bits`*).
5. The RPTBIT keyword must appear after the BITNUMBER/SIZE reference and will denote that successive BITNUMBER items will be read/written from the same word rather than successive words, which is the default.

   In addition, the number of bits specified cannot extend over a word boundary. For example, if BITNUMBER = 2, then the data can only extend from bits 2 to 15 for that word. Bit counting starts from 0. Thus, the number of bits must be limited to a value 14. Otherwise, an error will occur during validation. In general, the BITNUMBER must be ≤ 16.
6. If a number of items appear without one of the data type SQL keywords, then the data type will default to 2INT.

Example The following example will extract a floating point number, a 2-byte integer and 3 strings 10 characters long from an ODBC-compliant database, and store the values in record 5 of the file 256 starting at word 1.

```
select floatnum,intnum,string1,string2,string3 from rwb
where name_id='Fred Smith';
"@ TABLEREF TABLENUM 256 RECORDNUM 5 WORDNUM 1 NUMRECORDS 1
FLOAT 2INT CHAR 10 3 @"
```

The following example will extract a floating point number, a 2-byte integer and 3 strings 10 characters long from record 5 of the file 256 starting at word 1, and store this data in the SQL database.

```
insert into rwb
values(
where name_id='Fred Smith';
"@ TABLEREF TABLENUM 256 RECORDNUM 5 WORDNUM 1 NUMRECORDS 1
FLOAT 2INT CHAR 10 3 @"
```

SQL Report Example

The following example is written for Microsoft SQL Server. Some of the SQL syntax is specific to Microsoft SQL Server, for example, `getdate()`.

SQL Input Data Reference File

```
/* insert values from Points "01SQLANA","01SQLSTA" to ODBC-compliant database
"testtable"*/
insert into testtable
values(
"@ Pointref Pointname 01SQLANA parameter name @",
getdate(),
"@ Pointref Pointname 01SQLANA parameter PV @",
"@ Pointref Pointname 01SQLSTA parameter PV @",
"@ Pointref Pointname 01SQLANA parameter A1 @",
"@ Pointref Pointname 01SQLSTA parameter H1H @",
"@ Pointref Pointname 01SQLANA parameter OP @");

/* read from ODBC-compliant database "testtable" to Points
"01SQLANA","01SQLSTA""*/
select distinct testint from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter PV @"

select distinct testsmall from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLANA parameter A1 @"

select distinct smallfloat from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter H1M @"

select distinct testint from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter OP @"

select distinct smallfloat from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLANA parameter SP @"

select distinct name from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter DESC @"

/* read from a user table 4 (file 254) to ODBC-compliant database "testtable"*/
insert into testtable
values(
'New Record',
"@ tableref tablenum 254 record 1 word 1 datetime @",
"@ tableref tablenum 254 record 1 word 2 float double 4int 2int bit 0 size 8@"
);

/* read from user table 4 to ODBC-compliant database "testtable" with record
offset */
insert into testtable
values(
```

```
‘Offset Record’,
"@ tableref tablenum 254 record -1 word 1 datetime @",
"@ tableref tablenum 254 record -1 word 2 float
          double 4int 2int bit 0 size 8@");

/* read from ODBC-compliant "testtable" to user table 4*/
select distinct name,name,testdate,smallfloat,testint,
testsmall,testtiny,testtiny
from testtable where name=’01SQLANA’;
"@ tableref tablenum 254 rec 3 word 1 char 10 2 datetime float 2
2int bit 1 size 5 rptbit 2 @"

/* read from ODBC-compliant with record offset to user table */
select distinct name,name,testdate,smallfloat,testint,
testsmall,testtiny,testtiny
from testtable where name=’01SQLANA’;
"@ tableref tablenum 254 rec -3 word 1 char 10 2 datetime float 2
2int bit 1 size 5 rptbit 2 @"

/* read history values into ODBC-compliant */
update testtable set
testint=
"@ history Pointname 01SQLANA type H24H offset 3 @",
smallfloat =
"@history Pointname 01SQLANA type H6M date 15-FEB-94 time 13:48:00 @"
where name=’01SQLANA’
```

Contents of Report File and Output from SQLCHK

```
/* insert values from Points "01SQLANA","01SQLSTA" to ODBC-compliant
"testtable"*/
insert into testtable
values(
‘01SQLANA’,
getdate(),
1.200000e+01,
0.000000e+00,
0.000000e+00,
0.000000e+00,
0.000000e+00
);

/* read from ODBC-compliant "testtable" to Points "01SQLANA","01SQLSTA"""*/
select distinct testint from testtable where name=’01SQLANA’;
"@ Pointref Pointname 01SQLSTA parameter PV @"

select distinct testsmall from testtable where name=’01SQLANA’;
"@ Pointref Pointname 01SQLANA parameter A1 @"

select distinct smallfloat from testtable where name=’01SQLANA’;
```

```
"@ Pointref Pointname 01SQLSTA parameter H1M @"

select distinct testint from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter OP @"

select distinct smallfloat from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLANA parameter SP @"

select distinct name from testtable where name='01SQLANA';
"@ Pointref Pointname 01SQLSTA parameter DESC @"

/* read from a user table 4 (file 254) to ODBC-compliant "testtable"*/
insert into testtable
values(
'New Record',
'01-JAN-81 00:00',
0.000000e+00,
0.000000e+00,
0,
0,
0
);

/* read from user table 4 to ODBC-compliant "testtable" with record offset */
insert into testtable
values(
'Offset Record',
'01-JAN-81 00:00',
0.000000e+00,
0.000000e+00,
0,
0,
0
);

/* read from ODBC-compliant "testtable" to user table 4*/
select distinct name,name,testdate,smallfloat,testint,
testsmall,testtiny,testtiny
from testtable where name='01SQLANA';
"@ tableref tablenum 254 rec 3 word 1 char 10 2 datetime float 2
2int bit 1 size 5 rptbit 2 @"

/* read from ODBC-compliant with record offset to user table */
select distinct name,name,testdate,smallfloat,testint,
testsmall,testtiny,testtiny
from testtable where name='01SQLANA';
"@ tableref tablenum 254 rec -3 word 1 char 10 2 datetime float 2
2int bit 1 size 5 rptbit 2 @"

/* read history values into ODBC-compliant */
update testtable set
testint = 0.000000e+00,
```

```
smallfloat = 0.000000e+00

where name='01SQLANA'
```

PlantScape OPC Support

PlantScape provides both an OPC Client and an OPC Server. The OPC Server makes PlantScape Server point data available for use in other applications. The OPC Client is used to collect data from other OPC servers to put into PlantScape server point values.

The PlantScape OPC Server and Client can be used together or with third-party OPC Servers and Clients.

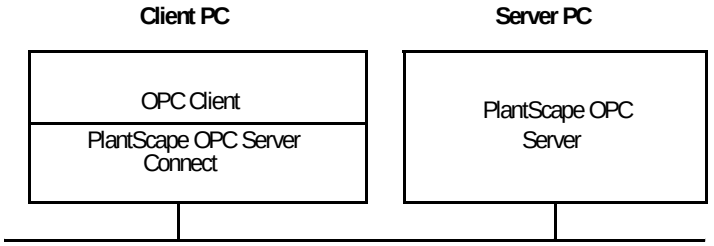
About the PlantScape OPC Client

The PlantScape OPC Client is described in detail in the OPC Interface section in the *Installation Guide*. Configuration is described in the Quick Builder online help.

About the PlantScape OPC Server

The PlantScape OPC Server makes all PlantScape point parameters available to OPC Clients. The OPC Server supports all mandatory OPC interfaces, including an automation interface for application development in Visual Basic. For more information on the automation interface refer to the *OLE for Process Control Standard Version 1.0a* or the *OLE for Process Control Standard Version 2.0*.

An example OPC client/server configuration is shown below.



Using the PlantScape OPC Server

Preparation

See the *PlantScape Installation Guide* for details on how to configure the PlantScape server computer and an OPC Client computer for OPC connection, and for a description of the PlantScape OPC Server Connect package that must be installed on OPC Client computers.

Connecting to the PlantScape OPC Server

An OPC Client requires two pieces of information to connect to the PlantScape OPC Server over the network.

1. TCP/IP hostname of the PlantScape Server computer
2. PlantScape OPC Server Prog Id.

The PlantScape OPC Server Prog Id is **HWHsc.OPCServer**.

Refer to the user documentation that came with your OPC Client software for details on using this information with your client.

Notes

- When you run an OPC client on the PlantScape Server computer you should use **localhost** as the TCP/IP hostname.
- The TCP/IP hostname of the server should be put in the hosts file of the computer that the OPC Client is running on. On Windows the TCP/IP hosts file is `winnt\system32\drivers\etc\hosts`

Accessing OPC Server Data

Data on the PlantScape OPC Server is accessed by building OPC Items with an OPC Client. An OPC Item represents a connection to an item of data on an OPC server. For example, an OPC item might be built on a client to reference a PlantScape analog point's PV parameter. An OPC Client can then access the value of the PV.

To build an item you are required to provide some or all or the following information.

- item name
- item type
- update rate and deadband

Refer to your OPC Client user documentation for details on item building.

PlantScape Data Addressing

Point parameter data is available via the PlantScape OPC Server. An item created to reference data must use an address consistent with the following formats:

Format for Simple Points (those other than Control Processor points)

`point.parameter [/enum]`

where

`point`
is the point ID.

`parameter`
is one of the possible point parameter names listed in "Point Parameter Data Addressing" on page 439.

`/enum`
specifies whether the parameter should be treated as an enumerated type. See "How Items Access Point Parameters of Type enum" on page 439.

Example **`FillDepth.PV`**

Format for Control Processor Points

`point.block.parameter [/enum]`

where

`point`
is the point ID.

`block.parameter`
is the control module parameter.

`/enum`
specifies whether the parameter should be treated as an enumerated type. See "How Items Access Point Parameters of Type enum" on page 439.

Example **`CM1.PIDA.MD`**

How Items Access Point Parameters of Type *enum*

Some point parameters are enumerated—they can be represented by both an integer and a string. Examples are: status point states, modes, and Control Module Point enumeration parameters.

Two methods of accessing enumerated parameters are supported:

Parameter is written and/or read as text

This requires the item to be built with the enum flag on.

```
point.parameter /enum
```

Note If an item is built with /enum for which the enum flag makes no sense, an empty string is returned.

Parameter is written and/or read as an integer

Enumerated type parameters can also be built without the enum flag. The server will then read and write the appropriate integer value. It becomes the responsibility of the client to convert the integer value into text if required.

Update Rates and Deadbands for Items

An update rate and a deadband can be associated with each item or group. The update rate is the fastest rate at which the OPC Server will notify the OPC Client of changes in data. The OPC Server will only notify the OPC Client of changes if the data has changed by more than the deadband. The OPC Client can automatically determine the update rate and deadband or it might require you to configure it. You can normally specify any update rate and deadband in your OPC Client, however, specifying high rates or low deadband values may put a high load on the PlantScape OPC Server and the connecting network. If the load is too high the PlantScape OPC Server will not return data at the requested rate.

Point Parameter Data Addressing

The following tables list the name of all parameters (for each point type) that can be accessed via the PlantScape OPC Server. They also list the OPC type of each parameter and indicate whether the parameter is read only.

Status Point Parameters

OPC Server Parameter Name	*OPC Type*	*OPC Access*	*Enumerated?*
PV	VT_I4		yes
Mode	VT_I4		yes

Table 20.4 Status Point OPC Parameter Names and Details

OPC Server Parameter Name	*OPC Type*	*OPC Access*	*Enumerated?*
OP	VT_I4		yes
Area	VT_BSTR	read only	
Point ID	VT_BSTR	read only	
Description	VT_BSTR	read only	
OnScan	VT_BOOL		
AlarmValue	VT_I4	read only	yes
ControlLevel	VT_I2		
AlarmDisabled	VT_BOOL		
PVInError	VT_BOOL	read only	
ModeInError	VT_BOOL	read only	
OutputInError	VT_BOOL	read only	
State0Descriptor	VT_BSTR		
State1Descriptor	VT_BSTR		
State2Descriptor	VT_BSTR		
State3Descriptor	VT_BSTR		
State4Descriptor	VT_BSTR		
State5Descriptor	VT_BSTR		
State6Descriptor	VT_BSTR		
State7Descriptor	VT_BSTR		
Target PV for OPState0	VT_I4	read only	yes
Target PV for OPState1	VT_I4	read only	yes
Target PV for OPState2	VT_I4	read only	yes
Target PV for OPState3	VT_I4	read only	yes
InputStateforOutputState3	VT_I4	read only	yes
PVAlgoNumber	VT_I2	read only	
PVAlgoBlock	VT_I2	read only	
ActionAlgoNumber	VT_I2	read only	
ActionAlgoBlock	VT_I2	read only	
UnackAlarmExists	VT_BOOL		
AlarmPriority	VT_I4		yes
ControlFailAlarmPriority	VT_I4		yes

Table 20.4 Status Point OPC Parameter Names and Details (Continued)

OPC Server Parameter Name	*OPC Type*	*OPC Access*	*Enumerated?*
State0AlarmPriority	VT_I4		yes
State1AlarmPriority	VT_I4		yes
State2AlarmPriority	VT_I4		yes
State3AlarmPriority	VT_I4		yes
State4AlarmPriority	VT_I4		yes
State5AlarmPriority	VT_I4		yes
State6AlarmPriority	VT_I4		yes
State7AlarmPriority	VT_I4		yes
AlarmSubPriority	VT_I4		
ControlFailAlarmSubPriority	VT_I4		
State0AlarmSubPriority	VT_I4		
State1AlarmSubPriority	VT_I4		
State2AlarmSubPriority	VT_I4		
State3AlarmSubPriority	VT_I4		
State4AlarmSubPriority	VT_I4		
State5AlarmSubPriority	VT_I4		
State6AlarmSubPriority	VT_I4		
State7AlarmSubPriority	VT_I4		
AssociatedDisplay	VT_BSTR		
AssociatedDisplayDefault	VT_BSTR		
InstructionDisplay	VT_BSTR		
InstructionDisplayDefault	VT_BSTR		
AlarmMessageIndex	VT_I2		
PVExternalChangeAlarmEnable	VT_BOOL		
MDExternalChangeAlarmEnable	VT_BOOL		
OPExternalChangeAlarmEnable	VT_BOOL		
State0AlarmEnabled	VT_BOOL		
State1AlarmEnabled	VT_BOOL		
State2AlarmEnabled	VT_BOOL		
State3AlarmEnabled	VT_BOOL		
State4AlarmEnabled	VT_BOOL		

Table 20.4 Status Point OPC Parameter Names and Details (Continued)

OPC Server Parameter Name	*OPC Type*	*OPC Access*	*Enumerated?*
State5AlarmEnabled	VT_BOOL		
State6AlarmEnabled	VT_BOOL		
State7AlarmEnabled	VT_BOOL		
NumberOfInputStates	VT_I2	read only	
NumberOfOutputStates	VT_I2	read only	
NormalMode	VT_I2		
PulseWidthSecs	VT_I4		yes
OPReverse	VT_BOOL		
ControlConfirmRequired	VT_BOOL		
ControlTimeoutPercent	VT_I4		yes
AlarmDeadbandPercent	VT_I4		yes
PointDetailDisplay	VT_BSTR		
PointDetailDisplayDefault	VT_BSTR		
GroupDetailDisplay	VT_BSTR		
GroupDetailDisplayDefault	VT_BSTR		
PVAlgoExists	VT_BOOL	read only	
ActionAlgoExists	VT_BOOL	read only	
PointInAlarm	VT_BOOL	read only	
State0InAlarm	VT_BOOL	read only	
State1InAlarm	VT_BOOL	read only	
State2InAlarm	VT_BOOL	read only	
State3InAlarm	VT_BOOL	read only	
State4InAlarm	VT_BOOL	read only	
State5InAlarm	VT_BOOL	read only	
State6InAlarm	VT_BOOL	read only	
State7InAlarm	VT_BOOL	read only	
ModeCheckDisabled	VT_BOOL		

Table 20.4 Status Point OPC Parameter Names and Details (Continued)

Analog Point Parameters

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
PV	VT_I2		
Mode	VT_I4		yes
OP	VT_I2		
SP	VT_I2		
A1	VT_R4		
A2	VT_R4		
A3	VT_R4		
A4	VT_R4		
EULO	VT_R4	read only	
EUHIe	VT_R4	read only	
AlarmLimit1	VT_R4		
AlarmLimit2	VT_R4		
AlarmLimit3	VT_R4		
AlarmLimit4	VT_R4		
AlarmType1	VT_I4		yes
AlarmType2	VT_I4		yes
AlarmType3	VT_I4		yes
AlarmType4	VT_I4		yes
Area	VT_BSTR	read only	
SetPointLowLimit	VT_R4		
SetPointHighLimit	VT_R4		
OutputLowLimit	VT_R4		
OutputHighLimit	VT_R4		
Point ID	VT_BSTR	read only	
Description	VT_BSTR	read only	
OnScan	VT_BOOL		
AlarmValue	VT_I4	read only	yes
ControlLevel	VT_I2		
AlarmDisabled	VT_BOOL		

Table 20.5 Analog Point OPC Parameter Names and Details

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
PVInError	VT_BOOL	read only	
ModeInError	VT_BOOL	read only	
OutputInError	VT_BOOL	read only	
SetPointInError	VT_BOOL	read only	
A1InError	VT_BOOL	read only	
A2InError	VT_BOOL	read only	
A3InError	VT_BOOL	read only	
A4InError	VT_BOOL	read only	
Units	VT_BSTR		
PVAlgoNumber	VT_I2	read only	
PVAlgoBlock	VT_I2	read only	
ActionAlgoNumber	VT_I2	read only	
ActionAlgoBlock	VT_I2	read only	
UnackAlarmExists	VT_BOOL		
UnreasonableAlarmPriority	VT_I2		
ControlFailAlarmPriority	VT_I2		
Alarm1Priority	VT_I4		yes
Alarm2Priority	VT_I4		yes
Alarm3Priority	VT_I4		yes
Alarm4Priority	VT_I4		yes
UnreasonableAlarmSubPriority	VT_I4		
ControlFailAlarmSubPriority	VT_I4		
Alarm1SubPriority	VT_I4		
Alarm2SubPriority	VT_I4		
Alarm3SubPriority	VT_I4		
Alarm4SubPriority	VT_I4		
AssociatedDisplay	VT_BSTR		
AssociatedDisplayDefault	VT_BSTR		
InstructionDisplay	VT_BSTR		
InstructionDisplayDefault	VT_BSTR		
AlarmMessageIndex	VT_I2		

Table 20.5 Analog Point OPC Parameter Names and Details (Continued)

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
PVExternalChangeAlarmEnable	VT_BOOL		
MDExternalChangeAlarmEnable	VT_BOOL		
OPExternalChangeAlarmEnable	VT_BOOL		
SPExternalChangeAlarmEnable	VT_BOOL		
NormalMode	VT_I4		yes
OPReverse	VT_BOOL		
ControlConfirmRequired	VT_BOOL		
ControlTimeoutPercent	VT_I4		yes
DriftDeadbandPercent	VT_I4		yes
AlarmDeadbandPercent	VT_I4		yes
ControlDeadbandPercent	VT_I4		yes
PVClampingEnabled	VT_BOOL		
PointDetailDisplay	VT_BSTR		
PointDetailDisplayDefault	VT_BSTR		
GroupDetailDisplay	VT_BSTR		
GroupDetailDisplayDefault	VT_BSTR		
PVAlgoExists	VT_BOOL	read only	
ActionAlgoExists	VT_BOOL	read only	
PointInAlarm	VT_BOOL	read only	
InRateOfChangeAlarm	VT_BOOL	read only	
InDeviationLowAlarm	VT_BOOL	read only	
InDeviationHighAlarm	VT_BOOL	read only	
InTransmitterLowAlarm	VT_BOOL	read only	
InTransmitterHighAlarm	VT_BOOL	read only	
InLowAlarm	VT_BOOL	read only	
InHighAlarm	VT_BOOL	read only	
InLowLowAlarm	VT_BOOL	read only	
InHighHighAlarm	VT_BOOL	read only	
InUnreasonablyLowAlarm	VT_BOOL	read only	
InUnreasonablyHighAlarm	VT_BOOL	read only	
A1ExternalChangeAlarmEnable	VT_BOOL		

Table 20.5 Analog Point OPC Parameter Names and Details (Continued)

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
A2ExternalChangeAlarmEnable	VT_BOOL		
A3ExternalChangeAlarmEnable	VT_BOOL		
A4ExternalChangeAlarmEnable	VT_BOOL		
ModeCheckingDisabled	VT_BOOL		
A1AssociatedParameter	VT_I4	read only	yes
A2AssociatedParameter	VT_I4	read only	yes
A3AssociatedParameter	VT_I4	read only	yes
A4AssociatedParameter	VT_I4	read only	yes

Table 20.5 Analog Point OPC Parameter Names and Details (Continued)

Accumulator Point Parameters

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
PV	VT_I2		
EUHI	VT_R4	read only	
AlarmLimit1	VT_R4		
AlarmLimit2	VT_R4		
AlarmLimit3	VT_R4		
AlarmLimit4	VT_R4		
AlarmType1	VT_I4		yes
AlarmType2	VT_I4		yes
AlarmType3	VT_I4		yes
AlarmType4	VT_I4		yes
RollOver	VT_I4		
MeterFactor	VT_R4		
ScaleFactor	VT_R4		
RawPVValue	VT_I4		
Area	VT_BSTR	read only	
PointID	VT_BSTR	read only	
Description	VT_BSTR	read only	

Table 20.6 Accumulator Point OPC Parameter Names and Details

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
OnScan	VT_BOOL		
AlarmValue	VT_I4	read only	yes
AlarmDisabled	VT_BOOL		
PVInError	VT_BOOL	read only	
Units	VT_BSTR		
PVAlgoNumber	VT_I2	read only	
PVAlgoBlock	VT_I2	read only	
ActionAlgoNumber	VT_I2	read only	
ActionAlgoBlock	VT_I2	read only	
UnackAlarmExists	VT_BOOL		
Alarm1Priority	VT_I4		yes
Alarm2Priority	VT_I4		yes
Alarm3Priority	VT_I4		yes
Alarm4Priority	VT_I4		yes
Alarm1SubPriority	VT_I4		
Alarm2SubPriority	VT_I4		
Alarm3SubPriority	VT_I4		
Alarm4SubPriority	VT_I4		
AssociatedDisplay	VT_BSTR		
AssociatedDisplayDefault	VT_BSTR		
InstructionDisplay	VT_BSTR		
InstructionDisplayDefault	VT_BSTR		
AlarmMessageIndex	VT_I2		
AlarmDeadbandPercent	VT_I4		yes
PointDetailDisplayDefault	VT_BSTR		
GroupDetailDisplayDefault	VT_BSTR		
PVAlgoExists	VT_BOOL	read only	
ActionAlgoExists	VT_BOOL	read only	
PointInAlarm	VT_BOOL	read only	
InRateOfChangeAlarm	VT_BOOL		
InPVHighAlarm	VT_BOOL		

Table 20.6 Accumulator Point OPC Parameter Names and Details (Continued)

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
InPVHighHighAlarm	VT_BOOL		

Table 20.6 Accumulator Point OPC Parameter Names and Details (Continued)

Control Processor Point Parameters

Below are the Control Processor point parameters which apply to all points. The point-specific parameters can be referred to as specified in “Format for Control Processor Points” on page 438.

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
Area	VT_BSTR	read only	
PointID	VT_BSTR	read only	
Description	VT_BSTR		
AlarmValue	VT_I4	read only	yes
ControlLevel	VT_I2		
UnackAlarmExists	VT_BOOL	read only	
AssociatedDisplay	VT_BSTR		
AssociatedDisplayDefault	VT_BSTR		
InstructionDisplay	VT_BSTR		
InstructionDisplayDefault	VT_BSTR		
AlarmMessageIndex	VT_I2		
PointDetailDisplay	VT_BSTR		
PointDetailDisplayDisplay	VT_BSTR		
GroupDetailDisplayDefault	VT_BSTR		
GroupDetailDisplay	VT_BSTR		

Table 20.7 Control Processor OPC Point Parameters and Details

Flexible Point Parameters

The following parameters are mandatory for all flexible points.

OPC Server Param Name	*OPC Type*	*OPC Access*	*Enumerated?*
Name	VT-BSTR	Read only	
Area	VT-BSTR	Read only	
Description	VT-BSTR	Read only	
PointDetailDisplay	VT-BSTR		
GroupDetailDisplay	VT-BSTR		
AssociatedDisplay	VT-BSTR		
Control Level	VT-I2		
InstructionDisplay	VT-BSTR		

Using the OPC Server to Control Read/Write Access

By default anyone with an account on a Client computer which is set up to communicate with the PlantScape OPC server has full read and write access to the server database. If this is not desirable, these permissions can be configured on a per-user basis on the server. To do this:

1 On the PlantScape Server, open up the registry and locate the key:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Honeywell\MyTpsDomain\HciComponents\PlantScape HCI Server\MethodSecurity
```

Note the file names specified as value data for the following value names:

- OPCRead
- OPCWrite

The files specified as value data are the files used for read/write access control. The file names can be changed if desired.

2 Use Explorer to locate (or create) these files in

```
\Hwiac\Security
```

Their content is not important.

3 Use Windows Explorer to set the Windows file permissions on these files.

Anyone with full access to the OPCRead file will have read access to the OPC Server.

Anyone with full access to the OPCWrite file will have write access to the OPC Server.

In order to allow a particular account to have read access, but deny write access to the OPC Server, the account must be given full access to the OPCRead file and have no access to the OPCWrite file. It is not possible to give an account write access to the OPC Server without also giving it read access.

For example: If the file name specified in the string OPCRead was MyReadFile:

– Right click MyReadFile file in Explorer and select **Properties**.
– Select the **Security** tab from the Properties window and click **File Permissions**.
– Add or delete users from the access list to set up the desired security.

PlantScape OPC Server Error Codes and Qualities

If you are developing your own OPC Client you need to know the error codes returned by the PlantScape OPC Server.

The following error codes and qualities are returned by the PlantScape OPC Server read function.

Function HRESULT	***Item HRESULT***	***Quality Value***	***Condition***
S_FALSE	0xE00483FD (for all items)	OPC_QUALITY_BAD | OPC_QUALITY_OUT_OF_SERVICE	Host backup
S_FALSE	0xE00483FC (for all items)	OPC_QUALITY_BAD | OPC_QUALITY_LAST_KNOWN	Host not running (but not backup)
S_FALSE	0xE0048231	OPC_QUALITY_BAD | OPC_QUALITY_CONFIG_ERROR	Invalid point number
S_FALSE	0xE0048232	OPC_QUALITY_BAD | OPC_QUALITY_CONFIG_ERROR	Invalid parameter number
S_FALSE	0xE004xxxx xxxx = status	0x0000 (non-specific)	Any other error status

The following error codes are returned by the PlantScape OPC Server write function.

Function HRESULT	*Item HRESULT*	*Condition.*
S_FALSE	0xE00483FD (for all items)	Host backup.
S_FALSE	0xE00483FC (for all items)	Host not running (but not backup).
S_FALSE	0xE0048222	Point not active.
S_FALSE	0xE0048223	Parameter error
S_FALSE	0xE0048224	Control inhibited
S_FALSE	0xE0048227	RTU disabled.
S_FALSE	0xE0048228	Channel disabled.
S_FALSE	0xE0048229	Illegal mode for control.
S_FALSE	0xE004822A	Value error.
S_FALSE	0xE0048212	Point on scan.
S_FALSE	0xE004xxxx xxxx = status	Any other error status.

PlantScape Application Programming Interface and Network API

If necessary, a site can develop its own custom applications to use in conjunction with PlantScape data.

- For applications that run on the PlantScape server, PlantScape provides an Application Programming Interface (API).
- For applications that run on another computer, PlantScape provides a Network API option.

You can also configure a PlantScape report to request an application program when it has completed running. For details of the PlantScape API and tools, see the *Application Development Guide*.

The Network API option can be used by application developers to create network applications. Network API has libraries of functions, header files, documentation, and sample source programs.

Network API gives:

- Read/write access to point parameter values (for example, read the PV of point ID = T1C123)
- Read access to history data
- Read/write access to PlantScape database files (user files)

For details of Network API, see the *Application Development Guide*.

The following diagram gives a simplified view of the relationship between the PlantScape server applications, the API, Network API, and the Network applications.

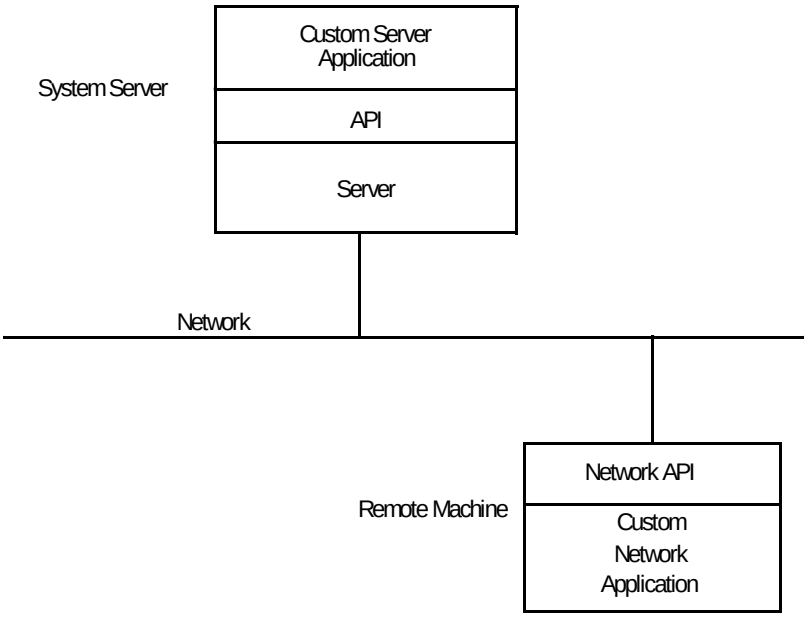


Figure 20.15 How Other Applications Can Work with PlantScape

Using Microsoft Excel Data Exchange

Using the Microsoft Excel Data Exchange option, you can capture real time point value and history information from PlantScape and display the data in an Excel spreadsheet.

Data can be retrieved from PlantScape by using either the Microsoft Excel Data Exchange Wizard, or through cell formulas. The captured data can be static or dynamically updating, and can consist of either point parameter or historical data from any PlantScape server database on the network.

Once the data has been captured you can create charts to display and analyze data with Microsoft Excel's toolset. You can also link the values into other OLE-enabled applications.

Microsoft Excel Data Exchange gives:

- Read/write access to point parameter values (for example, read the PV of point ID=T1C123)
- Read access to history data
- Read/write access to PlantScape database files (user files)

Using the Microsoft Excel Data Exchange Wizard

The following procedures explain how to capture point or history values and display them in Microsoft Excel using the Microsoft Excel Data Exchange Wizard.

Before beginning any of these procedures:

1 Start Microsoft Excel.
2 Open the worksheet in which you want your data displayed.
3 Highlight the cell that is to be the starting point for the data.

Retrieving Point Parameters

A cell in a Microsoft Excel worksheet can display the value of a parameter of a point configured on a particular PlantScape server, for example, the PV of point 01T1LEVEL from the server **hsserv**.

To display a particular point parameter:

1 Select **Tools ⇒ Microsoft Excel Data Exchange ⇒ Wizard**.
2 Select **Get point values from server(s)**.
Specify the target point parameters:
a) Enter the name of the PlantScape server.

b) Enter the desired point ID into the **Point ID** field, for example, **`01T1LEVEL`**.

c) Select the point parameter from the **Point Parameter** list (or type the parameter name into the field), for example, **PV**. You can add or remove point parameters as required.

Note The **Point Parameter** drop-down list displays all parameters, regardless of point type. You must select a parameter valid for your chosen point type.

d) Click **Add** to add the point parameter specification to the list.

3 Specify to arrange the data either **Horizontally** or **Vertically**.

4 Specify how the data is to be displayed on the worksheet.

Display Server Name

Inserts the name of the PlantScape server into a cell on your Excel worksheet.

Display Point ID

Inserts the name of the Point ID into a cell on your Excel worksheet.

Display Parameter

Inserts the parameter name into a cell on your Excel Worksheet.

Paste Values

When unchecked, it inserts updateable values in your Microsoft Excel Worksheet. When checked, it inserts fixed values into your Microsoft Excel Worksheet. Fixed values cannot be updated.

Minimize number of server calls

This option is only available when you choose to get history values from the PlantScape server. When it is unchecked, Microsoft Excel queries the PlantScape server separately for every cell that it fills with data on your Microsoft Excel worksheet. When checked, Microsoft Excel uses as few queries as possible; in general, this means just one query per server. It is important to check **Minimize number of server calls** when the values in the Microsoft Excel worksheet automatically update.

5 When you are satisfied with your selection of **Display Options**, click **Finish**. The data is displayed on your worksheet.

Retrieving Historical Information

You can insert a sequence of historical data into your Microsoft Excel worksheet. In a sequence, each cell contains a single sample from history, for example, five-second snapshots of the PV for point 01T1LEVEL from server **hsserv**.

To display a sequence of historical values:

1. Select **Tools ⇒ Microsoft Excel Data Exchange ⇒ Wizard** to start the wizard.
2. Select **Get history values from server(s)**.
3. You can specify the target point parameters you want retrieved.
4. Specify the desired historical values to be retrieved for the selected points.

   Note Ensure that your selection matches the history collection for the points on the server. If you select a history collection that is not configured for that point, Microsoft Excel displays an error code instead of the data.

   Note **Offset** is the number of samples relative to "now." You can select this option to see a continuously updating sequence of values. You use the **Date/Time** option to specify a sequence of values from a fixed period of time.
5. Specify how the data is to be displayed on the worksheet.

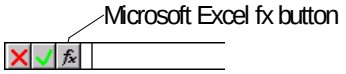
   Note To view continuously updating data, ensure **Paste values** is unchecked.

Using Cell Formulas

In addition to using the Microsoft Excel Data Exchange Wizard, you can use cell formulas to capture point or history values. Microsoft Excel Data Exchange includes a number of functions to allow data exchange with PlantScape. In fact, by using the Microsoft Excel Data Exchange Wizard to retrieve point parameters and historical data, you are actually using several of these functions.

To use the Microsoft Excel Data Exchange functions:

1. Select a cell, or a range of cells, where you want the data to appear.
2. Click in Excel's formula bar, then click the **fx** button to start the Microsoft Excel Function Wizard.



3. Select the function you want, as described below.

Caution

Do not use the Function Wizard for any **PUT** functions, as this may write undesired values to the server. See the Caution in "Microsoft Excel Data Exchange Functions" on page 461 for more details.

To select a function:

a) From the **Function Category** list, click **User Defined**.

b) Select a function from the **Function Name** list.

c) Enter any required details for the function.

For a more detailed explanation of each Microsoft Excel Data Exchange function, see "Microsoft Excel Data Exchange Functions" on page 461.

Changing the Data Updating Rate

Dynamic data on the worksheet is data retrieved by formulas. It includes data retrieved using the Microsoft Excel Data Exchange Wizard when the Paste values checkbox is unchecked (refer to "Using the Microsoft Excel Data Exchange Wizard" on page 454).

To check or to change the data update rate, select **Tools ⇒ Microsoft Excel Data Exchange**. The current setting for the active user account is selected. To change it, select the setting you want.

For best performance, the update rate should be greater than 5 seconds. The more formulas used in a worksheet, the more work has to be performed every time the worksheet is updated. With a large number of formulas, the time taken to update a worksheet might exceed the specified update rate.

Enabling Microsoft Excel Data Exchange under Different User Accounts

Microsoft Excel Data Exchange can only be installed for the current user account. If you log in under a different account, for example **mngr**, **engr**, or **oper**, you cannot see Microsoft Excel Data Exchange in Excel.

The following instructions show you how to enable Microsoft Excel to recognize a range of different user accounts. They assume that Microsoft Excel has been installed and Microsoft Excel Data Exchange has been installed to `\CLIENT\XLDATAEX`.

1 Start Microsoft Excel.

2 Check to see if the **Microsoft Excel Data Exchange** choice is in the **Tools** menu.

- If it is not there, then continue with the following steps.
- If it is there, then you need go no further, as Microsoft Excel Data Exchange has been successfully installed for the current account.

3 Go to the **Tools** menu and select **Add-Ins**.

4 Click **Browse**.

5 Navigate to the Microsoft Excel Data Exchange folder (in this case `C:\CLIENT\XLDATAEX`).

6 Select MEDE.XLA

7 Click **OK**.

8 In response to the prompt `Replace Existing ...?` click **Yes**.

9 Click **OK**.

10 The **Microsoft Excel Data Exchange** choice should now be available in the **Tools** menu.

You need to install Microsoft Excel Data Exchange for all user accounts that need to use it.

If you want to use .xls files that have been created by other users, you need to:

1 Open the workbook

2 Click **Tools ⇒ Microsoft Excel Data Exchange ⇒ Update Formulas in Workbook**

3 Save the workbook.

Interpreting Microsoft Excel Data Exchange Errors

When reading and writing data from/to a PlantScape server an error may be encountered when a formula is executed in a cell such as:

```
An unknown Parameter error was encountered (-32215) with
server “matchbox” and point “29471” : matchbox : 29471 : 3
```

To determine the cause of the error, double-click the Error Viewer icon in the PlantScape Diagnostic Tools group/folder.

An error message, such as the following is displayed.

Example

```
Enter argument(s) for display.exe (<ENTER> for none): -32215
08229 CONTROL - illegal mode for control of parameter
```

Using PlantScape Parameters with Microsoft Excel Data Exchange Functions

The following Microsoft Excel Data Exchange functions take the parameter argument as a string (for example, "PV", "SP"):

```
GetPointVal
GetPointValArray(actually a list eg "PV,MD,OP")
GetHistVal_Offset
GetHistValArray_Offset(actually a list e.g. "PV,MD,OP")
GetHistVal_Date
GetHistValArray_Date(actually a list e.g. "PV,MD,OP")
PutPointVal_Number
```

The following Microsoft Excel Data Exchange functions take the parameter argument as an integer (for example, 0 for PV, 3 for SP): For a list of integers, refer to "Summary of Internal Parameters" on page 134.

```
NAPI_rGetVal_Number
NAPI_rGetVal_Ascii
NAPI_rGetVal_History
NAPI_rPutVal_Number
NAPI_rGetHstPar_Ofst
NAPI_rGetHstPar_Date
```

The following functions do not have a parameter as an argument:

```
NAPI_rGetPnt_Num
NAPI_rGetPnt_Status
NAPI_rgetdat_int
NAPI_rgetdat_long
NAPI_rgetdat_float
NAPI_rgetdat_double
NAPI_rgetdat_str
NAPI_rputdat_int
NAPI_rputdat_long
NAPI_rputdat_float
```

```
NAPI_rputdat_double
NAPI_rputdat_str
```

Microsoft Excel Data Exchange Functions

The Microsoft Excel Data Exchange functions and parameters are listed on the following pages.

Caution

1. Functions that are prefixed by NAPI_ should only be used by advanced or experienced users who are familiar with the Network API.
2. Do not use the Microsoft Function Wizard to write NAPI routines into cells.

   When you enter the formula in the Wizard, it displays a value in the top of the Wizard to indicate what you will see in the cell, given the currently entered formula. To determine this value, Microsoft Excel actually runs the function, and this means that if you are setting up a PUTVAL, it will write down to the server as you enter your intermediate values.

   For example, if you write the PUTVAL (POINT,SP,123.4) it will write the values, 1, 12, 123 and 123.4 to the setpoint of POINT.

Formula Arrays

When using formulas in worksheet cells in Microsoft Excel, some formulas may return an array as a result. By default Microsoft Excel will only show the first element of the array in the cell the formula is in. To see the complete array, you need to spread the formula across a few cells.

To insert a formula array:

1. Select the cells in which you would like to insert the output.
2. Type in the function (or use the Microsoft Excel Function Wizard to build the function).
3. After adding the formula, press <Ctrl>+<Shift>+<Enter> (instead of <Enter>) to put the formula into all the cells.

This formula will only be executed once for the whole selection of cells and the output array will be placed in these cells.

Note If you click one of the cells in the formula array you will notice that the formula appears in parentheses { } instead of by itself.

To edit a formula array:

1. Select all the cells which form the formula array.
2. Click the formula in the formula entry line near the top of the window.
3. Edit the formula as necessary.
4. Press <Ctrl>+<Shift>+<Enter> to place the formula back into the formula array cells.

To change the number of cells in a formula array:

1. Follow Steps 1 and 2 of the editing instructions.
2. Copy the formula to the clipboard (press <Ctrl>+<C>).
3. Delete the cells.
4. Select the required cells for the new formula array.
5. Paste the formula from the clipboard (<Ctrl>+<V>).
6. Press <Ctrl>+<Shift>+<Enter> to place the formula back into the formula array cells.

For more information on these topics refer to Microsoft Excel's online documentation.

GetHistVal_Date

For a single point parameter, retrieves multiple consecutive history values by date and time. GetHistVal_Date inserts each history sample into an individual cell in your Microsoft Excel worksheet. Before using the function, you must highlight the cells that will contain history values (that is, you must highlight the number of rows and columns necessary for displaying the data).

Server	Name of the PlantScape server from which data is retrieved.
PointID	Name of the point on the PlantScape server from which data is retrieved.
PointParameter	The point parameter of interest, for example, **"PV"**. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types
HistoryType	The history type to be retrieved, for example, **"H5SF"** for fast history snapshots. Refer to "Types of History Collection" on page 167 for a list of history types.
HistoryDate	The start date of the historical data. The date can be entered in any string format that Microsoft Excel can interpret as a date or time, for example **"20/11/99"** or **"20-Nov-99"**. Enclose the date with double quotes.
HistoryTime	The starting time of the historical data to retrieve in 24 hour format. For example, **"17:30:15"** for 5:30:15pm. Enclose the time with double quotes.
NumHistoryValues	Number of history values to retrieve.
ArchivePath	Set this to " "

Example To retrieve 10 fast history values at 8:00am on 8 October 1998 for the PV parameter of point PNTANA1 on server HSSERVA.

```
=GetHistVal_Date("hsserva","pntana1","pv","h5sf","8 October
1997","8:00am",10,"")
```

GetHistVal_Offset

For a single point parameter, retrieves multiple consecutive history values by offset. GetHistVal_Date inserts each history sample into an individual cell in your Microsoft Excel worksheet. Before using the function, you must highlight the number of cells that will contain history values (that is, you must highlight the number of rows and columns necessary for displaying the data). Offset sets the function to retrieve samples relative to now. So, for example, setting an offset of 5, means the first sample is 5 samples ago.

For example, when you want to return five history samples with an offset of 5, you must select five consecutive cells horizontally across your spreadsheet, and the function returns the values from 5 samples ago until the current sample, inclusive.

Server	Name of the PlantScape server from which data is retrieved.
PointID	Name of the point on the PlantScape server from which data is retrieved.
PointParameter	The point parameter of interest, for example, **"PV"**. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.
HistoryType	History type of the point to retrieve. For example, **"H5SF"** for fast history snapshots. Refer to "Types of History Collection" on page 167 for a list of history types.
HistoryOffset	Starting history interval from now.
NumHistoryValues	Number of history values to retrieve.
ArchivePath	Set this to " "

Example To retrieve the last 10 fast history values for the PV parameter of point PNTANA1 on server HSSERVA.

```
=GetHistVal_Offset("hsserva","pntana1","pv","h5sf",1,10,"")
```

GetHistValArray_Date

For multiple point parameters, retrieves multiple consecutive history values by date and time. Before using the function, you must highlight the number of cells that will contain history values (that is, you must highlight the number of rows and columns necessary for displaying the data). This function can display data horizontally (history values by point parameters) or vertically (point parameters by history values).

NumPoints	Number of points.
Server	Name of the PlantScape server from which data is retrieved.
PointIDList	A list of point IDs on the PlantScape server from which data is retrieved. The names in the list must be separated by commas, for example **`"sinewave,tank1temp"`**. The number of names in the list must match the number specified in NumPoints.
PointParameterList	A list of point parameters separated by commas, for example **`"pv,sp"`**. The number of parameters in the list must match the number specified in NumPoints. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.
HistoryType	History type of the point to retrieve. For example, **`"H5SF"`** for fast history snapshots. Refer to "Types of History Collection" on page 167 for a list of history types.
HistoryDate	Starting date of historical data to retrieve. The date can be entered in different formats, for example **`"20/11/96"`** and **`"20-Nov-96"`**. Enclose the date with double quotes.
HistoryTime	Starting time of historical data to retrieve. The data is formatted in 24 hour format. For example, **`"17:30:15"`** for 5:30:15pm. Enclose the time with double quotes.
NumHistoryValues	Number of history values to retrieve.
ArrayOrientation	Enter **`"h"`** for horizontal and **`"v"`** for vertical.
ArchivePath	Set this to **`""`**

Example To retrieve 10 fast history values at 8:00 am on 8 October 1998 for the PV and OP parameters of point PNTANA1 on server HSSERVA, and format the output to display the history values for each parameter horizontally:

```
=GetHistValArray_Date(2,"hsserva","pntana1,pntana1","pv,op",
"h5sf","8 October 1997","8:00am",10,"h","")
```

GetHistValArray_Offset

For multiple point parameters, retrieves multiple consecutive history values by offset. Before using the function, you must highlight the number of cells that will contain history values (that is, you must highlight the number of rows and columns necessary for displaying the data). The function can display data horizontally (history values by point parameters) or vertically (point parameters by history values).

NumPoints	Number of points.
Server	Name of the PlantScape server from which data is retrieved.
PointIDList	A list of point IDs on the PlantScape server from which data is retrieved. These names must be separated by commas, for example **"sinewave,tank1temp"**. The number of names in the list must match the number specified by NumPoints.
PointParameterList	A list of point parameters separated by commas, for example **"pv, sp"**. The number of parameters in the list must match the number specified in NumPoints. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.
HistoryType	History type of the point to retrieve. For example, **"H5SF"** for fast history snapshots. Refer to "Types of History Collection" on page 167 for a list of history types.
HistoryOffset	Starting history interval from now.
NumHistoryValues	Number of history values to retrieve.
ArrayOrientation	Enter **"h"** for horizontal and **"v"** for vertical.
ArchivePath	Set this to **""**

Example To retrieve the last 10 fast history values for the PV and OP parameters of point PNTANA1 on server HSSERVA, and format the output to display the history values for each parameter horizontally:

```
=GetHistValArray_Offset(2,"hsserva","pntana1,pntana1",
"pv,op","h5sf",1,10,"h","")
```

GetPointVal

Retrieves a single point parameter value from the server.

Server	Name of the PlantScape server from which data is retrieved.
PointID	Name of the point on the PlantScape server from which data is retrieved.
PointParameter	The point parameter of interest, for example, **"PV"**. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.

Example To retrieve the current value for the PV of point PNTANA1 on server HSSERVA:

```
=GetPointVal("hsserva","pntana1","pv")
```

GetPointValArray

Retrieves the value of multiple point parameters from the server. Before using the function, you must highlight the number of cells that will contain history values (that is, you must highlight the number of rows and columns necessary for displaying the data). Can display data horizontally or vertically.

NumPoints	Number of points.
Server	Name of the PlantScape server from which data is retrieved.
PointIDList	A list of point IDs on the PlantScape server from which data is retrieved. These names must be separated by commas, for example **`"sinewave,tank1temp"`**. The number of names in the list must match the number specified in NumPoints
PointParameterList	A list of point parameters separated by commas, for example **`"pv,sp"`**. The number of parameters in the list must match the number specified in NumPoints. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.
ArrayOrientation	Enter **`"h"`** for horizontal and **`"v"`** for vertical.

Example To retrieve the current values for the PV and OP of point PNTANA1 on server HSSERVA, and arrange the parameter output values vertically:

```
=
Array(2,"hsserva","pntana1,pntana1","pv,op","v")
```

NAPI_rGetdat_int

Retrieves a single field from a user file in the following formats:

double	double precision (8 bytes) I.E.E.E. floating point
float	single precision (4 byte) I.E.E.E. floating point
int	two bytes signed integer
long	four bytes signed integer
str	character string

Server	Name of the PlantScape server from which data is retrieved.
File	PlantScape database file number. User files start from file 251 so that user file 1 is file 251, user file 2 is file 252 and so on.
Record	The record number in the user file.
Word	The word number in the record.
Flags	For a circular file, specifies the direction to read. Enter **`newest`** for the newest record or **`oldest`** for the oldest record. Enter 0 for non-circular files.

Example To retrieve the current system sinewave value (int) from file 8, record 1, word 114 from server hsserva:

```
=NAPI_rGetdat_int("hsserva",8,1,114,0)
```

NAPI_rGetdat_float

See “NAPI_rGetdat_int” on page 470.

NAPI_rGetdat_double

See “NAPI_rGetdat_int” on page 470.

NAPI_rGetdat_long

See “NAPI_rGetdat_int” on page 470.

NAPI_rGetdat_str

Retrieves a single field from a user file in string format

Server	Name of the PlantScape server from which data is retrieved.
File	PlantScape database file number. User files start from file 251 so that user file 1 is file 251, user file 2 is file 252 and so on.
Record	The record number in the user file.
Word	The word number in the record.
Flags	For a circular file, specifies the direction to read. Enter **`newest`** for the newest record or **`oldest`** for the oldest record. Enter 0 for non-circular files.
Length	The length of the string to retrieve.

NAPI_rGethstpar_date

Retrieves history parameter value for a single point by date and time.

Server	Name of the PlantScape server from which data is retrieved.
HistoryType	History type of the point to retrieve. For example, **6** for 5 second fast history. The history types and the parameter values are: • H1M (one minute history)—1 • H6M (six minute history)—2 • H1H (1 hour history)—3 • H8H (8 hour history)—4 • H24H (24 hour history)—5 • H5SF (fast history snapshots)—6 • H1HE (1 hour extended history)—7 • H8HE (8 hour extended history)—8 • H24HE (24 hour extended history)—9
HistoryDate	Starting date of historical data to retrieve. This must be entered as the number of days since 1 January 1981.
HistoryTime	Starting time of historical data to retrieve. This must be entered as the number of seconds since midnight.
NumHistoryValues	Number of history values to retrieve.
ArchivePath	Set this to " "
PointNumber	Point number of the point. See "NAPI_rGetPnt_Num" on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, PV. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.

Example To retrieve the 10 values of fast history at 8:00am on 8 October 98 for the PV of point PNTANA1 from server HSSERVA:

```
=NAPI_rGethstpar_date("hsserva",6,date(1997,10,8)-date(1981,
1,1),8*60*60,10,"", NAPI_rGetPnt_Num("hsserva","pntana1"),0)
```

NAPI_rGethstpar_ofst

Retrieves history parameter value for a single point by offset.

Server	Name of the PlantScape server from which data is retrieved.
HistoryType	History type of the point to retrieve. For example, **6** for 5 second fast history. The history types and the parameter values are: • H1M (one minute history)—1 • H6M (six minute history)—2 • H1H (1 hour history)—3 • H8H (8 hour history)—4 • H24H (24 hour history)—5 • H5SF (fast history snapshots)—6 • H1HE (1 hour extended history)—7 • H8HE (8 hour extended history)—8 H24HE (24 hour extended history)—9
HistoryOffset	Starting history interval from now.
NumHistoryValues	Number of history values to retrieve.
ArchivePath	Set this to " "
PointNumber	Point number of the point. See "NAPI_rGetPnt_Num" on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, PV. Refer to Table 8.1, "Summary of Point Parameter Types," on page 134 for a list of parameter types.

Example To retrieve the last 10 values of fast history for the PV of point PNTANA1 from server HSSERVA:

```
=NAPI_rGethstpar_ofst("hsserva",6,1,10,"",NAPI_rGetPnt_Num("
hsserva","pntana1"),0)
```

NAPI_rGetPnt_Num

Retrieves the point number for a point.

Server	Name of the PlantScape server from which data is retrieved.
PointID	Name of the point on the PlantScape server from which data is retrieved.

Example To retrieve the point number of point PNTANA1 from server HSSERVA:

```
=NAPI_rGetPnt_Num("hsserva","pntana1")
```

NAPI_rGetPnt_Status

Retrieves a point status information.

Server	Name of the PlantScape server from which data is retrieved.
PointID	Name of the point on the PlantScape server from which data is retrieved.

Example To retrieve the point status of point PNTANA1 from server HSSERVA:

```
=NAPI_rGetPnt_Num("hsserva","pntana1")
```

NAPI_rGetVal_Ascii

Retrieves a string parameter of a point.

Server	Name of the PlantScape server from which data is retrieved.
PointNumber	Point number of the point. See “NAPI_rGetPnt_Num” on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, DESC. Refer to Table 8.1, “Summary of Point Parameter Types,” on page 134 for a list of parameter types.

Example To retrieve the ASCII value of parameter DESC of point PNTANA1 from server HSSERVA:

```
=NAPI_rGetVal_Ascii("hsserva",NAPI_rGetPntNum("hsserva","pnt
ana1"),37)
```

NAPI_rGetVal_History

Retrieves the value of the PV history type of a point.

Server	Name of the PlantScape server from which data is retrieved.
PointNumber	Point number of the point. See “NAPI_rGetPnt_Num” on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, PV. Refer to Table 8.1, “Summary of Point Parameter Types,” on page 134 for a list of parameter types.
HistoryOffset	Starting history interval from now.

Example To retrieve the history value at history offset 5 of parameter H5SF (Fast History) of point PNTANA1 from server HSSERVA:

```
=NAPI_rGetVal_History("hsserva",NAPI_rGetPntNum("hsserva","p
ntana1"),46,5)
```

NAPI_rGetVal_Number

Retrieves a numeric parameter of a point.

Server	Name of the PlantScape server from which data is retrieved.
PointNumber	Point number of the point. See “NAPI_rGetPnt_Num” on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, PV. Refer to Table 8.1, “Summary of Point Parameter Types,” on page 134 for a list of parameter types.

Example To retrieve the numeric value of parameter PV of point PNTANA1 from server HSSERVA:

```
=NAPI_rGetVal_Number("hsserva",NAPI_rGetPntNum("hsserva","pn
tana1"),0)
```

NAPI_rPutdat_int

Writes a single value to a field in a user file in the following formats:

double	double precision (8 bytes) I.E.E.E. floating point
float	single precision (4 byte) I.E.E.E. floating point
int	two bytes signed integer
long	four bytes signed integer
str	character string

Server	Name of the PlantScape server to which the value is written.
File	PlantScape database file number. User files start from file 251 so that user file 1 is file 251, user file 2 is file 252 and so on.
Record	Record number in the user file.
Word	Word number in the record.
Flags	For a circular file, specifies the direction to read. Enter **`newest`** for the newest record or **`oldest`** for the oldest record. Enter `0` for non-circular files.
Value	Value to write.

Caution

Do not use any of these functions through Microsoft Excel's Function wizard, as multiple controls to undesired values may be performed for the given address. See the Caution at the beginning of "Microsoft Excel Data Exchange Functions" on page 461 for more details.

Example To store an integer value of 42 into user table 1, record 1, word 15 for server HSSERVA.

```
=NAPI_rPutdat_int("hsserva",251,1,15,0,42)
```

NAPI_rPutdat_float

See “NAPI_rPutdat_double” on page 481

NAPI_rPutdat_double

See “NAPI_rPutdat_double” on page 481

NAPI_rPutdat_long

See “NAPI_rPutdat_double” on page 481

NAPI_rPutdat_str

Writes a string to a field in a user file:

Server	Name of the PlantScape server to which the value is written.
File	PlantScape database file number. User files start from file 251 so that user file 1 is file 251, user file 2 is file 252 and so on.
Record	Record number in the user file.
Word	Word number in the record.
Flags	For a circular file, specifies the direction to read. Enter **`newest`** for the newest record or **`oldest`** for the oldest record. Enter `0` for non-circular files.
Value	Value to write.
Length	Length of the string to write.

Caution

Do not use this function through Microsoft Excel’s Function wizard, as multiple controls to undesired values may be performed for the given address. See the Caution at the beginning of “Microsoft Excel Data Exchange Functions” on page 461 for more details.

NAPI_rPutVal_Number

Set a numeric parameter of a point.

Server	Name of the PlantScape server from which data is retrieved.
PointNumber	Point number of the point. See “NAPI_rGetPnt_Num” on page 474 for details of how to obtain the point number for a point ID.
PointParameter	The point parameter of interest, for example, PV. Refer to Table 8.1, “Summary of Point Parameter Types,” on page 134 for a list of parameter types.
ParamValue	Value to set.

Caution

Do not use any of these functions through Excel’s Function wizard, as multiple controls to undesired values may be performed for the given point’s parameter. See the Caution at the beginning of “Microsoft Excel Data Exchange Functions” on page 461 for more details.

Example To store the numeric value of parameter SP of point PNTANA1 from server HSSERVA:

```
=NAPI_rPutVal_Number("hsserva",NAPI_rGetPntNum("hsserva","pn
tana1"),3,42)
```

21 Command Reference

This chapter describes the commands and utilities used to configure PlantScape. They are grouped as follows:

- Installation/Migration Commands
- Configuration Commands
- Controller Configuration Commands
- Diagnostic Commands
- Administration Commands
- Database Initialization Commands
- Application Development Commands

To run a command/utility, see Running PlantScape Commands/Utilities.

Running PlantScape Commands/Utilities

To use the commands and utilities described in this chapter you need to log on to the PlantScape server using a Honeywell Administrator account. (User accounts are described in the *Administration Guide*.)

To run a command/utility:

1 Select **Start** ⇒ **Programs** ⇒ **Accessories** ⇒ **Command Prompt** to open a Command Prompt window.

Alternatively, select **Start** ⇒ **Programs** ⇒ **PlantScape Server Diagnostic Tools** and then select the relevant tool.

2 Type the command and press <Enter>.

Installation/Migration Commands

The following commands and utilities are used for installation and migration tasks:

- setup
- sysbld
- utbconv
- pointmig

setup

Description

setup is primarily used to install the PlantScape server software and client software (Station, Display Builder, Quick Builder). It is also used for a number of optional tasks, such as:

- Removing the server and client software, or upgrading the client software
- Making a license change
- Viewing the PlantScape license
- Listing the installed server and client software

For details about **setup**, see the *Server and Client Installation Guide*.

Syntax

```
setup
```

sysbld

Description

sysbld is used to adjust the number of configurable database items within the maximum number of items permitted by your license. **sysbld** allows you to adjust:

- History retention periods, including duration and number of samples
- Number of points you can collect history for each history type
- Maximum number of:
  - Printer connections
  - Channels
  - Controllers
  - Algorithm blocks
  - Areas
  - Trend sets
  - Groups (operating groups)
  - Reports
  - Point control schedules
  - Operators
  - Concurrent alarms
  - Concurrent messages
  - Stored events
  - User files
  - Application tasks
  - Point lists

Caution

If you initialize the database, all your PlantScape Server configuration and process data will be deleted.

Syntax

```
sysbld mode [options]
```

Part	*Description*
mode	One of the following: `-initialise` Initializes the database, and deletes all configuration and process data. `-preserve` Preserves data in the database. See "Disk Space Considerations" on page 488.
options	`-default` Builds the database using default sizes. `-diag` Prints diagnostic messages. `-full` Resizes all database items. `-y` Answers yes to all questions.

Notes

- You cannot use **sysbld** to increase the size of the database for which you are currently licensed. To increase the database size, you need to upgrade your PlantScape software licence to provide for a larger database size. You can then run **setup** to change the size of your installed database.
- You must stop the PlantScape server before running **sysbld**.

Disk Space Considerations

If you preserve the contents of the database, the contents of the existing database are retained. However, some additional temporary disk space is required.

When **sysbld** preserves the database, it copies the data from each database file in the `\server\data` folder to a new re-sized file, one database file at a time. To calculate the amount of temporary disk space required, determine the size of the largest file in the `\server\data` folder, and make sure that you have at least this amount of temporary disk space available before running **sysbld**.

utbconv

Description

utbconv is provided to migrate point and parameter reference numbers embedded in user files from an old release of PlantScape to the current release. (When you upgrade to the current release, all parameter and point numbers except those in user files are automatically translated (if necessary) by the PlantScape installation process.)

Syntax

```
utbconv release_number input_file
```

Part	*Description*
release_number	The old release that is being migrated.
input_file	The relative path name of the input file specifying which user table words are to be migrated. See "UTBCONV Definition File Format" on page 489 for the input file format.

Notes

- Before migrating user files using **utbconv**, you must make a backup of the existing user files data using the **fildmp** utility—see "Backing Up User Files Before Using utbconv" on page 490.

Example

This example converts files from Release100 and use the input file `utable.def`.

```
utbconv 100 utable.def
```

UTBCONV Definition File Format

The definition file contains a line for each set of words to be migrated in each user file. The format of the lines is:

```
parameter, file=file_num, rec=record_num,
words=word_list
```

or

```
point, file=file_num, rec=record_num, words=word_list
```

Part	*Description*
file_num	The number of the file where the point or parameter number is located.
record_num	The records to be converted, either `all` or a specific record number.
word_list	The words to be converted, which can include: • Specific words, for example: `5` or `5, 9`. • Range A range of words, for example: `5-9`.

Notes

- Comments can be inserted by placing a # at the start of the line.

Example

The following example migrates:

- Parameter numbers at words 2, 5, 6, 7, 8, 9, and 12 of record 5 of user table 3 (file 253)
- Parameter numbers at word 2 or all records of user table 4 (file 254)
- Point number at word 7 of record 6 of user table 5 (file 255)

```
# example utbconv input file
#
parameter, file = 253, rec=5, words=2, 5-9, 12
parameter, file = 254, rec=all, words=2
point, file = 255, rec=6, words=7
```

Note the free-format of input files and the ability to specify ranges of words and all records for specific files.

Backing Up User Files Before Using utbconv

Before migrating user files using **utbconv**, you need to make a backup of the existing user files data using **fildmp**.

To back up, for example, records 1 to 10 of user file 1 to a file user_file.dmp:

1 Open a Command Prompt window, and enter **`fildmp`**

The system responds as follows:

```
System status is ON-LINE
Reading from memory. Writing to memory,disc,link.
Enter FUNCTION: 1-dump, 2-restore, 3-compare
```

2 Enter **1**

The system responds with:

```
Enter DEVICE/FILE name
```

3 Enter **user_file.dmp**

The system responds with:

```
Enter FILE number
```

4 Enter **251**

The system responds with:

```
Enter START,END record number
```

5 Enter **1,10**

The system responds with:

```
Enter FORMAT: "INT","HEX","ASC","FP"
```

6 Enter **hex**

The system responds with:

```
File 251 record 1 dumped
File 251 record 2 dumped
File 251 record 3 dumped
File 251 record 4 dumped
File 251 record 5 dumped
File 251 record 6 dumped
File 251 record 7 dumped
File 251 record 8 dumped
File 251 record 9 dumped
File 251 record 10 dumped
Enter FILE number
```

7 Press <Enter> twice to exit from **fildmp**.

8 Create a text file that specifies which words of each user file contain point numbers or parameter numbers and therefore need to be converted (see "UTBCONV Definition File Format" on page 489 for the format of this file).

pointmig

Description

pointmig is used to migrate point definition files from SCAN 3000 databases.

Syntax

```
pointmig release_number input_PDF
```

Part	*Description*
release_number	The release of SCAN 3000 under which the point definition file (PDF) was created. For example, 500 for Release 500 of SCAN 3000.
input_PDF	Is the path name of the file to be converted.

Notes

- **pointmig** can also be run in conjunction with **pntbld**. To do this, run **pntbld** with the **-R *xxx*** option (where ***xxx*** is the release you wish to migrate points from). This creates a file called `migrated.pnt` which is a migrated version of the input file provided to **pntbld**.

Configuration Commands

The following commands and utilities can be used for a range of configuration purposes.

- alglst
- bckbld
- dspbld
- hdwbckbld
- hdwbld
- paswrd
- pntbld
- qckbld
- rtusum
- station
- PlantScape Control Panel

alglst

Description

alglst lists the free algorithm blocks in the database.

Syntax

```
alglst
```

To run alglst:

1 Enter **alglst**.

The system responds with:

```
Enter first algo block number
```

2 Enter the lower limit of the range of algorithm block numbers in your system (usually **1**).

The system responds with:

```
Enter the last algo block number
```

3 Enter the upper limit of the range of block numbers.

The system reports:

– Any invalid algo block number

– The numbers of free algo blocks

Notes

- To run **alglst**, the database must be loaded, but the server software can be running or not running.
- If you want help, enter **alglst -?**

bckbld

Description

bckbld is used to create a point definition file that reflects the current point configuration details in the server database. It is used, for example, when you have made changes to point configuration data via Station, rather than via Quick Builder or **pntbld**.

After creating a point definition file, you can upload it into a Quick Builder project. For details, see the Quick Builder help.

Syntax

```
bckbld [-out file_name] [options]
```

Part	*Description*
file_name	The name of the file to which the point definitions are written. By default the output goes to the screen.
options	The options are: `-rtu` *rtu_number* Only backbuilds points on the specified controller. The default is to backbuild all points. `-id` *Point_id* Only backbuilds the specified point. `-tag` *tag_type* Only backbuilds points of the type specified by *tag-type*, which is: • `STA` for status • `ANA` for analog • `ACC` for accumulator `-nh` Suppresses history definitions. `-ng` Suppresses group definitions. `-nt` Suppresses trend definitions. `-np` Suppresses point record definitions. `-ns` Suppresses output file sorting. `-nd` Suppresses dynamic parameters. `-gp` Groups the output by points (but does not alphabetically sort the point IDs). `-st` Specifies output files sorting. `-fd` Generates full dynamic parameter definitions.

Notes

- To run **bckbld**, the database must be loaded, but the server software can be running or not running.
- Quick Builder cannot upload a file created with the `-ns` option because it has history, trend, and group point build lines at the bottom of the file. Quick Builder requires all point build lines related to a point to be grouped together. If you want to upload the file, do not specify an option, or specify the `-gp` option.
- If more than 500 points are being built at the same time, **bckbld** may take a long time to sort the file. You can use the `-ns` (no-sort) or `-gp` (partial-sort) option to speed up the process.
- If you did not specify a PVSOURCE, the point will not be backbuilt in an rtu when using: **`bckbld -rtu -out tmp.pnt`**. To pick up the point use: **`bckbld -out tmp.pnt`**.

Example

This example saves the point definitions for all points in a file called `point.txt`.

```
bckbld -out point.txt
```

dspbld

Description

dspbld starts Display Builder and opens a display or exports a display (system or custom).

For details, see the *Display Building Guide*.

hdwbckbld

Description

hdwbckbld is used to create a hardware definition file that reflects the current hardware configuration details in the server database. It is used, for example, when you have made changes to hardware and hardware connections via Station, rather than via Quick Builder or **hdwbld**.

After creating a hardware definition file, you can upload it into a Quick Builder project. For details, see the Quick Builder help.

Syntax

```
hdwbckbld [-out file_name] [options]
```

Part	*Description*
file_name	The name of the file to which the hardware definitions are written. By default the output goes to the screen.
options	`-all` Is used to backbuild all channels, controllers, printers and stations defined in the server `-chn` *chn_num* Backbuilds the specified channel. `-cn` *cnt_num* Backbuilds the specified controller. `-prt` *ptr_num* Backbuilds the specified printer `-stn` *stn_num* Backbuilds the specified Station `-chncnt` *chn_num* Backbuilds the specified channel and controllers associated with that channel. `-cntchn` *cnt_num* Backbuilds the specified controller and the channel to which the controller belongs

Notes

- To run **hdwbckbld**, the database must be loaded, but the server software does not need to be running.

hdwbld

Description

hdwbld defines hardware and hardware connections in your system.

For most configuration tasks, the preferred engineering tool is Quick Builder, which generates the **hdwbld** input file and runs the utility.

For details about **hdwbld**, refer to the *Hardware and Point Build Reference*.

Notes

- To run **hdwbld**, the database must be loaded, but the server software can be running or not running.
- Quick Builder does not fully support configuration for redundancy, and for redundant systems you need to use **hdwbld** directly. See "Configuring and Monitoring a Redundant Server System" on page 301 for details.

paswrd

Description

paswrd is used to change the passwords for Station security levels if you use Station-based security.

For details, see “Configuring Station-Based Security” on page 214.

Notes

- To run **paswrd**, the database must be loaded, but the server software can be running or not running.

pntbld

Description

pntbld is used to define points for the system.

Notes

- You should use Quick Builder in preference to **pntbld** to define points.
- For details of creating or updating point definition files and running **pntbld**, see the *Hardware and Point Build Reference*.
- To run **pntbld**, the database must be loaded, but the server software can be running or not running.

qckbld

Description

qckbld starts Quick Builder and, if specified, opens a project.

Syntax

```
qckbld [filename]
```

Part	*Description*
filename	The project file that is opened.

Notes

- The folder in which Quick Builder is located must be specified. If you want to run the utility from the Command prompt, you must first change to the Quick Builder folder before running the command.

rtusum

Description

rtusum lists all points assigned to a particular controller. Control information for each point is also displayed.

Syntax

```
rtusum controller_number [-v]
```

Part	*Description*
controller_number	The number of the controller.
-v	Shows the bit, width, format and imgsiz.

Notes

- To run **rtusum**, the database must be loaded, but the server software can be running or not running.

station

Description

station starts Station.

Syntax

```
station [setupfile] [-s[f][x][s][c]][-z[1|2|3]]
[-t tracefile]
```

Part	*Description*
setupfile	The default Station setup file. If no file is specified, `default.stn` is used.
`-sf`	Disables window resizing so that Station can only operate in full screen mode.
`-sx`	Disables the **Exit** menu item.
`-ss`	Disables the **Setup** menu item.
`-sc`	Disables the **Connect** menu item.
`-z[`*n*`]`	The zoom level used when Station is started: `-z1` Starts Station at the largest window size for the current resolution. `-z2` Starts Station at the second largest window size for the current resolution. `-z3` Starts Station at the third largest window size for the current resolution If not specified, Station starts up in full screen.
-t *tracefile*	The file to which trace data is copied.

Notes

- The folder in which Station is located must be specified. If you want to run the utility from the Command prompt, that you must first change to the Station folder before running the command.

Example

This example uses `opsetup.stn` as the setup file, `trace.txt` as the file for trace data, and disables window sizing and the **Exit** and **Setup** menu items.

```
station.exe opsetup.stn -sfxs -t trace.txt
```

PlantScape Control Panel

PlantScape Control Panel is used to update the server registry settings for:

- The path for displays (so that the server can get data from displays into the run-time database)
- The default path for history archives
- The font used in reports

To run the PlantScape Control Panel:

1. From the **Start** menu, select **Programs** ⇒ **PlantScape Server** ⇒ **PlantScape Server Control Panel**.
2. Select an entry from the **Registry Key** list, and then use the **String** field to edit the registry settings.

Controller Configuration Commands

The following commands and utilities can be used for various controller configuration purposes:

- config
- tdc_cl

For information about controller-specific utilities, including test utilities, see the associated Controller Reference. These references are available from Quick Builder's Help menu.

config

Description

config is used with TDC and UDC controllers. It enables the server's configuration image for controllers and channels to be saved and restored to files.

Syntax

To save channel or controller configuration data to a file:

```
CONFIG SAVE file {-CHN cc|-RTU rr} [-RENEW]
```

To restore channel or controller configuration data from a file to the specified channel or controller with the same channel and controller:

```
CONFIG RESTORE file {-CHN cc| cc-RTU rr} [-FROM nn]
```

To list channel and controllers whose configuration data is contained in the file:

```
CONFIG LIST file
```

Part	*Description*
file	The file to which the data is saved/restored.
cc	The channel whose data is being saved/restored.
rr	The controller whose data is being saved/restored.
-RENEW	Saves data to an existing file.
-FROM	Allows you to restore controller *nn* from the file to controller *rr.*

Notes

- To use the RESTORE option, the system must be running and the controllers must be disabled. See "Enabling and Disabling Channels and Controllers" on page 109 for information on disabling controllers.

Example

This example saves the configuration data for controller 21 to a file called box21.

```
config save box21 -rtu 21
```

tdc_cl

Description

tdc_cl is used to compile CL programs ready for loading into an MC/AMC. (TDC 3000 Multifunction & Advanced Multifunction Controllers (MC/AMCs) can be programmed using CL to execute user-defined control strategies or custom functions.)

Syntax

```
tdc_cl file [-d][-x]
```

Part	*Description*
file	The name of the CL source file (with a `.cl` extension).
`-d`	Compiles source lines beginning with `%DEBUG`.
`-x`	Generates reference data during compilation.

Diagnostic Commands

The following commands and utilities can be used for server diagnostics:

- dcheck
- display
- lisscn
- listag
- tail
- trace

For controller diagnostics, see to the associated Controller Reference. These references are available from Quick Builder's Help menu.

dcheck

Description

dcheck is a database index integrity checker. You may need to use this utility if you experience problems with Event Archiving files after a power failure or some other unexpected event which prevents data from being logged properly.

You use the dcheck utility to:

- Find the configuration of the file
- Check the integrity of a file
- Repair a faulty index
- Rebuild an index from data
- View index contents

Syntax

```
dcheck [options] isamfile
```

Part	*Description*
options	`-i` Checks the index only. `-l` Lists the contents of the index. `-n` Does not rebuild the index. `-y` Rebuilds the index if it is faulty. `-q` Does not print unless necessary. `-b` Rebuilds the index from the data. `-h` Prints out the files structure, no checking. This option does not require exclusive access to the file. `-x` Outputs the contents of each key in hex/ascii (printables print as expected, non printables as hex pairs). `-o` Prints a list of numbers which refer to the record number in the order that they are indexed. This option can be used with the -q option to create a filter for quick printing.

isamfile	The input file, which can be one of three files:
	`\server\evtarch\online\events`
	`\server\evtarch\archive\events`
	`\server\evtarch\playback\events`

display

display is used to display text for server error codes.

Syntax

```
display error_code
```

Part	*Description*
`error_code`	The number of the server error code for which you want more information. If the error code is hexadecimal, prefix it with `0x`.

Notes

- To run this command, the database must be loaded, but the server software does not need to be running.

Example

This example displays the description for hexadecimal error code 0106.

```
display 0x0106
```

lisscn

Description

lisscn lists the following configuration details:

- The scan packets in each scan interval (or period)
- The number of scan packets per interval
- The scan packets per interval per second

Syntax

```
lisscn [options]
```

Part	*Description*
-ALL	Lists all scan packets (default).
-OUT *file_name*	The file to which the results are written. The default is to display the output on the screen.
-INT *interval_no*	Lists scan packets by scan interval number.
-RTU *rtu_number*	Lists scan packets by controller number.
-CHN *channel_no*	Lists scan packets by channel number.
-all_add	Lists all addresses in the scan packet.
-all_ref	Lists all references to an address.

Notes

- To run **lisscn**, the database must be loaded, but the server software does not need to be running.

listag

Description

listag lists the points currently configured in the database.

Syntax

```
listag [options]
```

Part	*Description*
-OUT *file_name*	The file to which the results are written. The default is to display the output on the screen.
-ALL	Lists all point types (default).
-FM *n*	Specifies the first point number in the list.
-ND *n*	Specifies the width of the point description column. The default is 30 characters.
-NW *n*	Specifies the width of the point name column. The default is 16 characters.
-TO *n*	Specifies the last point number in the list.

Notes

- To run this command, the database must be loaded, but the server software can be running or not running.
- If you just type **listag**, you are prompted to specify the point type and a range of point numbers.

tail

Description

tail displays the last few lines of the server log file.

Syntax

```
tail [-f] file
```

Part	*Description*
`-f`	Runs **tail** indefinitely. When you use the `-f` option: • Any new lines are appended to the file. • You can stop the utility by pressing <Ctrl>+<C>.
file	The name of the server log file, for example, `\server\data\log.txt`.

Notes

- The most recent messages are stored in a file whose default name is `log.txt`. When this file reaches the maximum size (2Mb), `log.txt` is moved to the logfiles directory under `\server\data`. New log messages are then added to a new (and empty) `log.txt` file.
- To run the **tail** utility, the database must be loaded and the server must be running.

trace

Description

trace is used to record communications activity for Stations and channels.

Syntax

```
trace [lrn1 [-Llrn2] [-Mmem_size]]
```

Part	*Description*
lrn1	First LRN that is traced.
lrn2	Second LRN that is traced.
mem_size	The amount of tract is captured, in Kb (default 30Kb).

Notes

- To start a trace, the database must be loaded and the server must be running.
- To stop a trace, enter **`trace 0`**.
- To dump captured information, enter **`trace`**.

Example

This example start a trace for LRN 69 with 512Kb buffer.

```
trace 69 -M512
```

This example starts a trace for both communications links for an FS90 channel on channel 2 with 1M memory usage.

```
trace 63 -L64 -1024
```

Viewing the Trace Buffer Contents

If you want to view the contents of a trace buffer after you have stopped a trace, you can redirect the output of the trace command to a file. For example, to save it to a file called “trace.dmp” enter **`trace > trace.dmp`**.

You can then use a text editor to view the contents of the file.

Administration Commands

The following commands and utilities can be used for administrative tasks:

- hscserver /start
- hscserver /stop
- dspclr
- hisint
- usrlrn
- tagflb

hscserver /start

Description

hscserver /start starts PlantScape.

For more information, see the *Administration and Startup Guide*.

hscserver /stop

Description

hscserver /stop stops PlantScape.

For more information, see the *Administration and Startup Guide*.

dspclr

Description

dspclr:

- Removes displays from the Display Summary
- Clears specified displays

Syntax

```
dspclr [first_display] [first_display] [-y]
```

Part	*Description*
first_display	The number of the first display that is removed.
first_display	The number of the last display that is removed.
-y	Removes the displays without requesting confirmation.

Notes

- **dspclr** only applies to numbered displays.

Example

This example clears displays numbered between 400 and 450 without confirmation.

```
dspclr 400 450 -y
```

hisint

Description

hisint deletes all history and event data from the server database.

Syntax

```
hisint [options]
```

Part	*Description*
-SILENT	Executes without prompting.
-PRESERVE	Preserves the file's contents.
database	Restores history/events from the specified database.
-R*nnn*	PlantScape's release number. Required if you are restoring history/events.
-DIAG	Displays diagnostic messages.
-HISTORY*n*	Initialize only History file *n*.
-EVENT	Initialize only the Event file.
-DELAY	Initialize only the Delay file.
-SOE	Initialize only the SOE file.

Notes

- To run **hisint**, ensure that:
  - All history that you want to keep has been archived
  - The server is stopped
  - The database is loaded
- To see a list of options, enter **`hisint -?`** .

usrlrn

Description

usrlrn displays logical resource numbers (LRNs) that are used or are available for server tasks.

Syntax

```
usrlrn [options]
```

Part	*Description*
-a	Displays all LRNs.
-h	Displays usage.
-p	Displays process IDs as well as LRNs.
-u	Displays all used LRNs.

Notes

- To find out which LRNs are available for a new application, enter **usrlrn**.

Example

This example lists all LRNs that are used, with their associated process IDs.

```
usrlrn -p -a
```

tagflb

Description

tagflb rebuilds the files that PlantScape uses to store database locations for points.

These files are the data file, `tagfl.dat`, and the index file, `tagfl.idx`, and are located in `\server\data\`. (Sometimes the files are jointly called the tag file.)

Syntax

```
tagflb
```

Notes

- To run **tagflb**, ensure that:
  - You have copied `tagfl.dat` and `tagfl.idx` to another folder, so that you can restore them if necessary
  - The server is stopped
  - The database is loaded
- Any errors in creating the tag file are displayed. They must be rectified for correct operation of point ID callup.

Database Initialization Commands

These commands and utilities are used to initialize the database:

- pntdel
- almint

> **Caution**
>
> Do not run these commands/utilities unless you are absolutely sure that you want to remove the information from your PlantScape database.

For other database initialization commands, see the technical notes that come with PlantScape.

pntdel

Description

pntdel deletes all channel, controller, and point configuration from the server database.

> **Caution**
>
> If you delete the configuration data, it cannot be recovered without rebuilding the data from scratch. History data will also be lost.

Syntax

```
pntdel
```

Notes

- To run **pntdel**, ensure that:
  - The server is stopped
  - The database is loaded
- When you run pntdel, you are prompted to initialize:
  - Point configuration
  - Hardware (channel and controller) configuration
  - User-defined data formats
- Depending on the database size and hardware platform, deleting all points might take some time.

almint

Description

almint initializes the Alarm Summary queue.

> **Caution**
>
> Running **almint** will delete the contents of the alarm summary queue from the PlantScape database.
>
> It does not, however, remove the alarms from the event file.

Syntax

```
almint [-point] [-nopoint] [-force]
```

Part	*Description*
`-point`	Clears the alarm state of all points.
`-nopoint`	Does not clear the alarm state of points.
`-force`	Forces execution on a running system.

Application Development Commands

The following commands and utilities are primarily used for application development purposes. However, they are also useful for some configuration and administration tasks:

- fildmp
- fileio
- taglog
- rtusum

fildmp

Description

fildmp is used for dumping, restoring, or comparing the contents of server logical files with standard text files. See “utbconv” on page 489 for an example of the use of **fildmp** for backing up user files.

For more details about **fildmp**, see the *Application Development Guide*.

fileio

Description

fileio is an interactive utility that is used for modifying the contents of individual fields in a logical file.

For more details about **fileio**, see the *Application Development Guide.*

taglog

Description

taglog lists information associated with the specified points in the server database. It is used to find out if a point exists and to determine its internal point number.

For more details about **taglog**, see the *Application Development Guide*.

22 Troubleshooting Advice

This chapter contains advice on handling common errors and problems that you might encounter while carrying out configuration and system administration procedures.

It describes how you can monitor your system status and provides troubleshooting advice for:

- Station problems
- Other hardware and connection problems
- Scanning and communications problems

Note If your system includes PlantScape Control Processors, you might also need to refer to the PlantScape Process Software documentation.

Troubleshooting Station Connections and Station Displays

Use the following suggestions to help with Station connection and Station display problems.

Server (Local) Station Connections

Before attempting to establish a connection between the server (or local) Station and the server, check that you have defined the Station in the server database and defined the Station as local in the Station Setup file (as described in "Configuring Station Connections" on page 63).

If the Station is having problems connecting to the server, check the following.

- If the message "Connecting" or "Timeout on connect" is displayed in the Station message zone, verify that TCP/IP has been configured and that the program responsible for accepting connections from Stations (`ripsd.exe`) is running.

  Use Microsoft Windows Task Manager to check which processes are running. If the Station program is not running, the problem is probably the result of an incorrect installation.
- If the message "Waiting for Host Communications" is displayed, check that the server is running.

LAN Station Connections

If you cannot establish a connection between a LAN Station and the server:

- Check that you have connected the hardware and installed the LAN software as described in the *Server and Client Installation Guide*.
- Follow the procedures described for troubleshooting a server (local) Station connection (see "Server (Local) Station Connections" on page 532).
- Use standard networking utilities such as **ping**, **telnet**, and so on, to ascertain network connectivity.

When Station Cannot Find Display Files

If Station connects successfully but cannot call up a display, it generally responds with the message:

```
The display file xxx was not found.
```

To resolve this problem you need to:

- Check the registry entry for the path for Station displays. See "PlantScape Control Panel" on page 505 for information on using the **PlantScape Control Panel** utility to set or check the registry entry for display paths.
- Check the display paths specified in the Station setup file. For details, see "Displays Tab" on page 70.

Alphanumeric Display Object in Error

If an alphanumeric display object does not show an expected value but instead shows a series of red question marks (??????????), this indicates the server is unable to determine a value. Check the configuration of the display object for any errors.

A Point History display might show a series of question marks (??????????). This indicates a value of minus zero.

Scanning and Communications Problems

If you need to contact Honeywell Technical Support for assistance with a problem, the support engineer might ask you for certain information to help diagnose the problem. This section describes how to gather useful information for troubleshooting by Honeywell.

Determining Which Software Is Installed

You use the **setup** utility to view details of the software options that are installed at your site. For more information see "setup" on page 486, or the *Server and Client Installation Guide*.

Gathering Information about the Current Scanning Load

The Station display page number 10 shows statistics for PlantScape's scanning system. It indicates if any of the communications channels are in a state of overload.

To call up the Scanning Statistics display, press the **Page** function key (<F5>) and then enter **10** at the prompt in the top right-hand corner of the window.

For more information about scanning loads, refer to "Point Scanning" on page 145, "Checking the Scanning Performance of Your System" on page 190, and "lisscn" on page 512.

Measuring the Current System Loading

The current CPU loading can be measured by the Windows Performance Monitor.

To measure CPU load:

1. Start **Performance Monitor**.
2. Select **Add to Chart** from the **Edit** menu.
3. Select the **Processor** object and the counter **% Processor Time**.
4. Click **Add** then **Done**.

Windows Performance Monitor also gathers information about other aspects of system performance such as free memory. Consult the documentation or online help for more details.

Finding Out Which Processes Are Running

Use Microsoft Windows Task Manager to check which processes are currently running.

Gathering Information Using the Diagnostic Capture Tool

The Diagnostic Capture Tool allows you to easily save your log file, trace information and other diagnostic information in a single zip file. You can send this file to technical assistance for help with diagnosing problems in your system.

To access the Diagnostic Capture Tool, select (whichever is appropriate):

- **Start ⇒ Programs ⇒ PlantScape Server ⇒ Diagnostic Capture Tool** for the PC running the server software
- **Start ⇒ Programs ⇒ PlantScape Client ⇒ Diagnostic Capture Tool** for the PC running only Station software.

Gathering Information from the Log File

To access the log file, select **Start ⇒ Programs ⇒ PlantScape Server ⇒ Diagnostic Tools ⇒ PlantScape Server Log**

You can use the **tail** utility to gather information from the PlantScape log file. For details of the **tail** utility, refer to “tail” on page 514.

Performing a Communications Trace

The PlantScape **trace** utility can be used to record communications activity for Stations and channels. For details of the **trace** utility, see “trace” on page 515.

Restoring Communications with the CDA Server

If you are using Honeywell Hybrid Controllers in your system, you might encounter a “CDA Comms” alarm. This alarm is flagged by the message that “the server has lost communication with the CDA Server”. It indicates that the server is unable to communicate with the CDA Server process.

If the process is not running, you need to start it. If it is running, you need to restart it.

Miscellaneous Tips

The following procedures might be useful for troubleshooting or configuration tasks.

Monitoring System Status

To help determine when your system might need attention, you can monitor your system status from time to time, by following the instructions in "Monitoring the Status of Communications in Your System" on page 111.

Displaying Lists of Points by Controller

To check which points are configured for each controller, call up the Controller Point List display as follows:

1 From a Station menu bar, choose **Configure ⇒ System Hardware ⇒ Controller Interfaces ⇒ Controllers**.

This displays the Controller Configuration Summary display.

2 Click **View Points** for a controller to display the Controller Point List display.

Note You cannot view points for user scan task controllers in this way.

Glossary

accumulator point

A *point* type used to represent counters. Information contained in the accumulator point can include: the raw value, a process value, a rollover value, a scale factor, and a meter factor.

acronym

A text string used on a display to represent a state or a value in a form that is convenient for operators. For example, a value of "0" for a point parameter in the database might be represented on a system status display by the acronym "Stopped".

action algorithm

One of two types of algorithm you can assign to a point in order to perform additional processing to change point parameter values. An action algorithm performs an action when the value of the PV changes. Contrast with *PV algorithm*.

ActiveX component

An ActiveX component is a type of program designed to be called up from other applications, rather than being executed independently. An example of an ActiveX component is a custom dialog box, which works in conjunction with *scripts*, to facilitate operator input into *Station*.

alarm

An indication (visual and/or audible) that alerts an operator at a Station of an abnormal or critical condition. Each alarm has a type and a *priority*. Alarms can be assigned either to individual points or for system-wide conditions, such as a controller communications failure. Alarms can be viewed on a Station display and included in reports. PlantScape classifies alarms into the following types:

- PV Limit
- Unreasonable High and Unreasonable Low
- Control Failure
- External Change

alarm/event journal

A file that records all alarms and events. It is accessed to generate reports and can also be archived to off-line media.

alarm priority

One of four levels of severity specified for the alarm. The alarm priorities from least to most severe are:

- Journal
- Low
- High
- Urgent

algorithm

See *point algorithm.*

analog point

A point type that is used to represent continuous values that are either real or integer. Continuous values in a process could be: pressure, flow, fill levels, or temperature.

ANSI

American National Standards Institute

API

Application Programming Interface.

application program

A user-written program integrated into PlantScape using the Application Programming Interface (API).

area

A logical sub-section of your plant or process. Custom displays, points, and access configuration may be partitioned by area. Operators or Stations can be assigned access to particular areas only.

automatic checkpointing

In a redundant server system, the automatic transfer of database updates from the primary server to the backup server.

auxiliary parameter

An analog point parameter in addition to PV, SP, OP, and MD. Up to four auxiliary parameters can be used to read and write four related values without having to build extra points.

bad value

A parameter value, (for example, PV), that is indeterminate, and is the result of conditions such as unavailable input.

client software

An umbrella term covering PlantScape, Quick Builder, Station, and Display Builder software.

channel

The communications port used by the server to connect to as controller. Channels are defined using the Quick Builder tool.

CIM

Communications Interface Module

collection

A collection is a set of named values or *display objects* that are used in *scripts*.

Control Builder

The control building software for the Honeywell PlantScape Control Processor.

control failure alarm

For *analog* and *status* points, an *alarm* configured to trigger if a *demand scan* on the source address of an OP, SP, MD, or other parameter finds that the value after a control is issued does not match the controlled value.

control level

A security designation assigned to a *point* that has a destination address configured (for analog or status points only). A control level can be any number from 0 to 255. An operator will be able to control the point only if they have been assigned a control level equal to, or higher than, the point control level.

control parameter

A point parameter defined to be used as a control. A control parameter has both a source and a destination address. The destination for the parameter value is usually an address within the controller. Control parameters can be defined as automatic (server can change) or manual (operator can change).

controller

A device that is used to control and monitor one or more processes in field equipment. Controllers include Programmable Logic Controllers (PLCs), loop controllers, bar code readers, and scientific analyzers.

Controllers can be defined using the Quick Builder tool. Some controllers can be configured using Station displays.

database controller

See *User Scan Task controller*.

database point

Any *point* that has one or more parameters with database addresses.

DCD

Data Carry Detect.

DCS

Digital Control System.

DDE

Dynamic Data Exchange.

default

The value that an application automatically selects if the user does not explicitly select another value.

deleted item

In Quick Builder, an item that has been flagged for deletion from the server database and appears in the Recycle Bin grouping. When a download is performed, the item is deleted from both the server database and the Quick Builder project database.

demand scan

A one-time-only scan of a point parameter that can be requested either by an operator, a report, or an application.

DHCP

Dynamic Host Configuration Protocol.

display

Station uses displays to present PlantScape information to operators in a manner that they can understand. The style and complexity of displays varies according to the type of information being presented.

Displays are created in *Display Builder*.

Display Builder

The Honeywell tool for building customized graphical displays representing process data.

display object

A display object is a graphic element, such as an alphanumeric, a pushbutton or a rectangle, in a *display*.

Display objects that represent point information (such as an alphanumeric) or issue commands (such as a pushbutton) are called “dynamic” display objects.

Distributed Server Architecture

An option that enables multiple PlantScape servers to share point data, alarms, and history without the need for duplicate configuration on any server. This is the preferred method for transferring data between servers in large systems.

DNS

Domain Name System.

DSR

Data Signal Ready.

DTE

Data Terminal Equipment.

DTR

Data Terminal Ready.

dual-bit status point

A status point that reads two bits. Status points can read one, two or three bits.

EIM

Ethernet Interface Module.

ELPM

Ethernet Loop Processor Module.

EMI

Electromagnetic Interference.

event

A significant change in the status of an element of the system such as a point or piece of hardware. Some events have a low, high, or urgent priority, in which case they are further classified as alarms. Events can be viewed on an operator Station display and included in reports.

Within the context of *scripts*, an event is a change in system status or an operator-initiated action that causes a *script* to run.

exception scan

A scan that takes place only when a change occurs at a controller address configured for a point parameter. Some controllers can notify the server when a change occurs within the controller. The server uses exception polling to interrogate the controller for these changes. This type of scan can be used to reduce the scanning load when a fast periodic scan is not required.

export

In relation to Station displays, the process of registering a *display* with the *server* so that it can be called up in *Station*.

In relation to Quick Builder, the process of converting the configuration data in a project file into text files for use with other applications.

Extended Event Archiving

Every event, such as point status change or an operator action, is stored in an event journal. The online event journal is only capable of storing a certain number of events. With Extended Event Archiving you can archive these events to disk and tape, where they may be stored for future retrieval.

extended history

A type of history collection that provides snapshots of a point at a designated time interval that can be:

- 1-hour snapshots
- 8-hour snapshots
- 24-hour snapshots

fast history

A type of history collection that records 1-30-second snapshot history for points.

field address

The address within the controller that contains stored information from a field device being monitored by the controller.

free format report

An optional report type that enables users to generate their own report.

FTP

File Transfer Protocol.

history

Point values stored to enable tracking and observation of long-term trends. Analog, status, and accumulator point PVs can be defined to have history collected for them. Three types of history collection are available:

- Standard
- Extended
- Fast

history gate

A status point parameter that is used to control the collection of history for an analog or status point. The history is only collected if the gate state value of the nominated parameter is in the nominated state.

host server

In a distributed server architecture, the server on which a remote point's definition is stored and from which alarms for the point originate.

HTTP

Hypertext Transfer Protocol.

HVAC

Heating, Ventilation and Air Conditioning.

Hybrid Controller

The term used to refer to all control hardware (chassis, power supply, Control Processor, and ControlNet bridge) as a single entity in a PlantScape system.

IEEE

Institute of Electrical and Electronic Engineers.

input value

Values that are usually scanned from the *controller* registers but can be from other server addresses. Input values can represent eight discrete states. Up to three values can be read from an address in order to determine a state.

IRQ

Interrupt Request.

item

In Quick Builder, the elements necessary for data acquisition and control that comprise the PlantScape server data and are defined in the project file. These are:

- Channels
- Controllers
- Stations
- Points
- Printers

item grouping

A collection of items grouped by a common property.

item list

In Quick Builder, a listing of the items defined in the project file that displays in every Project View. The item list can be used to find an item and then display its properties.

item number

Item numbers are used in the server database to identify items. In Quick Builder, the number is assigned to an item internally. The item numbers for channels, controllers, Stations and printers can be overwritten in Quick Builder to match an existing system database.

LCS 620

Logical Control System 620. Honeywell's programmable logic controller.

local display object

A dynamic *display object* that displays information or issues a command, but which is not linked to the *server*. Such display objects are used in conjunction with *scripts*.

local server

The server to which the operator's station is connected.

MCI

Media Control Interface.

MD

PlantScape abbreviation for *mode*.

Microsoft Excel Data Exchange

A network option that can be used to capture the most recent point and history information in the server and display it in Microsoft Excel spreadsheets, mainly for reporting.

Mode

A point parameter which determines whether or not the operator can control the point value. For example, in a status point, the mode determines whether the operator can control the output value, and in an analog point the mode determines the control of the setpoint. If the mode is set to manual, the operator can change the value.

Network Node controller

A server running the system software defined as a controller to another server running the system software. The local server can scan and control points that have been defined in the remote Network Node controller.

notification

An event or alarm.

ODBC

See *Open Database Connectivity*.

ODBC driver

A driver that processes ODBC (Open Database Connectivity) calls, queries the database, and returns the results. See also *Open Database Connectivity*.

OP

PlantScape abbreviation for *output*.

Open Database Connectivity

A standard set of function calls for accessing data in a database. These calls include the facility to make SQL (Structured Query Language) queries on the database. To use ODBC you must have support from the client application (for example, Microsoft Access) which will generate the ODBC calls and from some database-specific software called an *ODBC driver*.

Operating Group

A group of up to eight arbitrarily chosen points that can be viewed by an operator on a standard Station display. An Operating Group can be defined in Quick Builder or in Station.

operator ID

A unique identification assigned to each operator. If Operator-Based security is enabled, the operator must use this ID and a password to sign on to a Station.

operator password

A character string (not echoed on screen) used with the operator ID to sign on to an operator Station.

operator security level

See *security level*.

Operator-Based security

Operator-Based security comprises an operator ID and password, which must be entered at an operator Station in order to access PlantScape functions.

output

A *point* parameter used to issue control values. The output (OP) is often related to the mode (MD) parameter and can be changed by an operator only if the mode is manual.

parameter

The different types of values accessed by *points* are known in PlantScape as “point parameters.”

The main point parameters are process variable (PV), output (OP), set point (SP), and mode (MD).

PlantScape can store and manage multiple values in the one point. You can therefore use a single point to monitor and control a complete loop. In many cases, however, the only parameters of a point that need to be configured are:

- The PV which shows the current value of a given location within a controller, and
- An OP used to reset or control a point

The names of the parameters reflect their most common usage. They can, however, be used to hold any controller values.

periodic scan

A defined regular interval in which the server acquires information from the controller and processes the value as a point parameter. The scan period must be defined in Quick Builder for each point source parameter value.

PIN

Plant Information Network

PLC

See Programmable logic controller.

point

A data structure in the server database, usually containing information about a field entity. A point can contain one or more *parameters*. A point is classified by type: status, analog, or accumulator.

PlantScape uses different point types to represent a range of different field values. The point types themselves can be of either a flexible or fixed structure depending on the type of controller they are associated with. Flexible structure points are used for the Honeywell Hybrid Controller and fixed structure points are used with all other controllers.

The fixed point types are:

- Status
- Analog
- Accumulator

point algorithm

A prescribed set of well-defined rules used to enhance a point's functionality. The point algorithm accomplishes this by operating on the point data either before or after normal point processing.

There are two types of point algorithms, PV (processed every time the point parameter is scanned) and Action (processed only when a point parameter value changes).

Point Detail display

A display that shows the current point information. Each point has a Point Detail display.

Process software

An umbrella term for Control Builder and other process software.

process variable

An actual value in a process: a temperature, flow, pressure, and so on. Process variables may be sourced from another parameter and may also be calculated from two or more measured or calculated variables using algorithms. Status points have a PV of the current state (0 to 7) (eight possible states).

programmable logic controller (PLC)

A control and monitoring unit that connects to a field device and controls low-level plant processes with very high-speed responses. A PLC usually has an internal program that scans the PLC input registers and sets the output registers to the values determined by the program. When connected to the server, the input and output values stored in the PLC registers can be referenced, and the server can read and write to these memory addresses.

project

In Quick Builder, a working database file that enables you to make changes to the server database without affecting the configuration data that is currently being used to run the system.

project view

In Quick Builder, a window in which you can view, add, and modify any items in the current project file.

PV

PlantScape abbreviation for *process variable*.

PV algorithm

One of two types of algorithm you can assign to a point in order to perform additional processing to change point parameter values. A PV algorithm changes the value of the point process value (PV) input only. Contrast with *Action algorithm*.

PV clamp

For an analog point, a configuration that will immobilize the process value (PV) at 0% if it falls below the entry low limit value or at 100% if it goes above the entry high limit value.

PV period

An amount of time specified for the scanning of the point process value (PV) parameter. The PV period determines the frequency with which the scan will be performed by the server. The server groups point addresses into scan packets by PV period and controller.

Quick Builder

Quick Builder is a graphical tool that is used to define the hardware items and some point types in a PlantScape system. Quick Builder can run either on a PlantScape server, on another computer in your system, or on a laptop.

After defining hardware and points with Quick Builder, you download these definitions from Quick Builder to the PlantScape server database.

recipe

A set of points used in a process. The Recipe Manager option enables point parameters for sets of points to be downloaded with pre-configured working values. The individual point parameters are the recipe "ingredients."

redundant server

A second server actively linked to the primary server and used as a backup system. Active linking ensures that data in the second server is constantly updated to mirror the primary server.

remote server

A server that supplies data to a local server over either a local area network (LAN) or a wide area network (WAN).

report

Information collected by the server database that is formatted for viewing. There are several pre-formatted reports, or the user can customize a report. Reports may be generated on demand or at scheduled intervals. Reports can be printed or displayed on an operator Station.

REX

Request to exit.

RFI

Radio Frequency Interference.

RLSD

Receive Line Signal Detect.

RTS/CTS

'Request to send'/'clear to send'.

RTU

See *controller*.

S9000

Series 9000 controller.

SafeBrowse object

A SafeBrowse object is a Web browser specifically designed for use with *Station*. SafeBrowse includes appropriate security features that prevent users from displaying unauthorized Web pages or other documents in Station.

scan

The technique used to read data from a controller. Scans are conducted for point parameters with source addresses (for example, PV, SP, OP, MD, An). PlantScape uses demand, exception, and periodic scanning techniques.

scan packet

A group of point parameter source addresses assembled by the server and used as the basic unit of server data acquisition. The server groups points into scan packets based on the controller address that they reference and the scan period defined.

scan period

The time interval that specifies the frequency at which the PlantScape server reads input values from the memory addresses of controllers. Scan periods are measured in seconds; a scan period of 120 seconds means that the server scans the controller once every 120 seconds.

scheduler

A facility used to schedule the control of a point on either a periodic or once-only basis.

script

A script is a mini-program that performs a specific task. In displays, for example, scripts are often used to produce animations.

security level

Access to PlantScape functions is limited by the security level that has been assigned to each operator. PlantScape has six security levels. An operator is assigned a security level and may perform functions at or below the security level that has been assigned to that operator.

server

The computer on which the PlantScape database software runs.

Server software

An umbrella term used to refer to the database software and server utilities installed on the PlantScape server computer.

server Station

A computer running both the PlantScape database (server) software and the Station software.

setpoint

The desired value of a process variable. Setpoint is a point parameter, whose value may be entered by the operator. The setpoint can be changed any number of times during a single process. The setpoint is represented in engineering units.

shape

A shape is a special type of *display object* that can be used in numerous *displays*.

Shapes can be used as "clip-art" or as *shape sequences*.

shapelink

A shapelink is, in effect, a "window" which always displays one *shape* of a *shape sequence*. For example, a shapelink representing a point's status displays the shape that corresponds to the current status.

shape sequence

A shape sequence is a set of related shapes that are used in conjunction with *shapelinks*. A shape sequences can be used to:

- Represent the status of a point (Each shape represents a particular status)
- Create an animation (Each shape is one "frame" in the animation)

SOE

Sequence of events.

softkey

A softkey is a function key which, when pressed, performs an action specified in the configuration details for the current *display*.

SP

PlantScape abbreviation for *set point*.

Standard history

A type of history collection for a point that provides one-minute snapshots and the following averages based on the one-minute snapshots:

- 6-minute averages

- 1-hour averages
- 8-hour averages
- 24-hour averages

Station

The main operator interface to PlantScape. Station can run on either a remote computer through a serial or LAN link, or the server computer.

When Station is running on the server computer, it is often referred to as a *server Station*. When it is running on a machine other than the server, it is often referred to as an operator Station.

Station Automation object model

The Station Automation object model provides the programming interface through which *scripts* control *Station* and its *displays*.

status point

A point type used to represent discrete or digital field values. The point can have input, output, and mode values. Input values can represent eight discrete states and cannot be changed by an operator. Up to three values can be read from up to three consecutive, discrete locations in the controller and thus can represent up to 8 states.

Output values can be used to control up to two consecutive discrete locations in a controller. Output values can be automatic or operator-defined.

Mode values apply to output values and determine whether or not the output value is operator-defined or automatic.

supervisory control

The action of writing information to a controller. PlantScape enables both automatic and manual supervisory control. See *Mode*.

task

A task is any of the standard server programs or an application program that can be invoked from a *display*.

TCP/IP

'Transmission Control Protocol'/'Internet Protocol'. A standard network protocol.

TDC 3000

Total Distributed Control 3000 (Honeywell's Digital Control System.)

terminal server

A device on the local area network (LAN) that connects to a controller by way of a serial connection and enables the controller to "talk to" the PlantScape server on the LAN.

timer

A timer is a programming mechanism for running *scripts* at regular intervals in *Station*.

Trend Set

A set of point parameter historical data, usually shown as a graph on a standard Station display. Trend sets can be defined using Quick Builder or a Station display.

UDC

Universal Digital Controller.

Unreasonable High and Unreasonable Low alarms

Alarms configured for an unreasonably high value and an unreasonably low value for the PV of an analog point.

URL

Uniform Resource Locator. For example, a Web address.

User Scan Task controller

A server software option used to configure a server database table (called a "user file") to act as a controller. The server interfaces with the user file rather than the actual device.

In this way you can write software to interface with the server and to communicate with devices that are connected to, but not supported by, the PlantScape server. The PlantScape server can then scan data from the user files into points configured on the User Scan Task controller and, for control, the PlantScape server can write point control data to the user file or a control queue.

utility

PlantScape programs run from a command line to perform configuration and maintenance functions; for example, the **lisscn** utility.

virtual controller

See *User Scan Task controller*.

WINS

Windows Internet Name Service.

WWW

World Wide Web.

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